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ABSTRACT

This document consists of the six 1991 issues of a specialized newsletter directed at outdoor activities participants and containing articles on a wide variety of topics related to health maintenance and emergency medical treatment in the wilderness. Articles discuss: (1) fever and appropriate treatments; (2) symptoms, prevention, and treatment of hypothermia; (3) symptoms and treatment of autonomic dysreflexia due to spinal cord injury; (4) transmission, diagnosis, and treatment of leptospirosis; (5) allergy to insect stings in children and immunotherapy; (6) management of fractures and dislocations in the wilderness environment; (7) safety and physical conditioning for whitewater rafting; (8) preventing the spread of hepatitis B, AIDS, and other communicable diseases to emergency care providers; (9) sweat, dehydration, and fatigue; (10) first aid for dogs; (11) leeches; (12) fractures of the face; (13) procedures for search and rescue teams; (14) patellofemoral pain syndrome; (15) classical conditioning therapy to reduce episodes of Raynaud's syndrome; (16) estimating and understanding blood pressure; (17) research on emergency medical services incidents in national parks; (18) hand injuries in rock climbers; and (19) arthritis. Also included are book reviews, short notes on first aid tips and new treatments, announcements of conferences and seminars, letters to the editor, and information on the Wilderness Medicine Institute and its curriculum. (SV)

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Wilderness Medicine Newsletter

FOR THE RECOGNITION, TREATMENT, AND PREVENTION OF WILDERNESS EMERGENCIES

January/Feburary, 1991 Volume 2, Number 1

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Fever: A Hot Time in the Cold Outdoors

by Buck Tilton

Winter seems to be the time of the year when we're most likely to develop the warm discomfort of a fever. It's not that germs are more active or greater in number, but that they are better able to slip through our immunological defenses when we're physiologically depressed by the cold's effects. Mom probably wanted to starve the fever of our childhood to death - or did she want to feed it? A fever is bad for us, right? Well, maybe not.

Fevers are something we share with most animals. In the lower vertebrates, the ones with cold blood (fish, reptiles, amphibians), the invasion of a pathogen, a disease-causing microorganism, induces a "behavioral fever." They migrate to a warmer place. A trout will seek a quiet, shallow pool where the sun warms the water. A tree frog will climb to the upper branches for exposure to the warmth of the sun.

Birds and mammals are less dependent on the external environment. The robins and the rabbits, and humans, elevate internal levels of metabolism to produce the fever. In the warm-blooded, the need for an elevated temperature is recognized by the hypothalamus, a small chunk of tissue near the bottom and slightly toward the back of the brain. The hypothalamus is our thermostat, responsible for the maintenance of normal body core temperature. Poisons circulating in our blood, the virus

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Fever . . .

(Continued from page 1)

of a common "cold," for example, stimulate the hypothalamus to increase metabolism thus increasing our temperature. This initial rise in temperature gives us an advantage over the invading pathogen. Our ability to defeat the invaders is enhanced.

Paradoxically, this rise in temperature is most often marked by abrupt chills. The patient with a high fever may tremble as if exposed to a raging snowstorm. The chilling process encourages us to wrap up in blankets, throw more logs on the fire, and snuggle up to hot water bottles. We involuntarily encourage the fever. This is the first phase of a fever.

Is fever a friend? Studies suggest it comes as a friend, but it's visit had best be short.

The brain withdraws from normal activity. It wants to be left alone, and it doesn't want the body that houses it to move around. Friends are not welcome, work is out of the question, even thinking becomes a burden. Warmth and rest is the febrile brain's greatest good. This marked reduction in activity is the second phase of a fever.

When the fever reaches a satisfactory level, the brain seems to relax. Chills tend to go away, aches and pains ease off, a sense of relief washes slowly over the patient. This is a second paradox: a feeling of comfort in the midst of a high fever that has reached its max. This third phase of a fever may be very long and filled with unseen changes taking place on the inside of the patient.

A high fever in humans is accompanied by rises in the heart rate, respiratory rate, and blood pressure. The gastrointestinal tract may temporarily cease to function as a digesting system. Loss of interest in things sexual occurs. In a prolonged high fever, growth stops and aging accelerates.

So what we have is a plus side to a fever: an increased metabolic state that increases our ability to heal ourselves. And a minus side: the same increase in metabolism places major life functions - digestion, growth, reproduction - at risk, and may lead to the breakdown of certain organs of the body and, eventually, the collapse and death of the whole organism - me or you - due to exhaustion. Is fever a friend? Studies suggest it comes as a friend, but it's visit had best be short.

Appropriate treatment for fevers involves four areas. 1) Establishing a healthful external environment. 2) Facilitating the increased metabolic state, 3) Protecting the vulnerable organs at risk from the fever. 4) Administering drugs that specifically fight the infection.

To ignore the early stage of a fever is undoubtedly a poor choice. Encourage the patient into the restful, withdrawn state as soon as possible. Avoid exposure to cold. Keep the patient near a source of warmth, wrapped in protective clothing and other insulating materials. Give warm drinks. There exists no ideal medication for early fever, and aspirin and other fever-reducers should probably be withheld during the initial stage. Fever-reducers (antipyretics) mask symptoms and delay required rest. So if the patient must walk out of the woods, antipyretics can be helpful. But if the disease is contagious, the patient becomes a "Typhoid Mary," sharing the sickness with others. Mild fevers are best left to run their course.

As the fever peaks, plenty of fluid becomes critical to the patient's well-being. Thirst will not increase to match the patient's need for water. The best way to check on adequate hydration is to monitor urine output. Patients should produce at least a quart a day, and it should be clear. Since digestion begins to fail, there is no point in forcing the patient to eat, but if hunger is present, feed it.

Children and young adults can tolerate fevers of 104 degrees F for several days without permanent damage. Older adults, especially the elderly, may be susceptible to damage and death almost immediately at that temperature. Anyone who reaches 106 degrees F should be considered a critical emergency. Fevers that last too long in the young, and go too high in the older, must have a physician's attention. Since fevers are difficult to measure in the backcountry, patients with obviously warm and flushed skin, a glassy look in the eye, and an altered level of consciousness should be evacuated as soon as possible to a medical facility.

Anyone who reaches 106 degrees F should be considered a critical emergency.

These people need the antipyretic aid of aspirin, acetaminophen, or ibuprofen. If the evacuation is delayed or extended, sponge the patient's skin, especially the face and head, with tepid water. Antibiotic therapy, under a doctor's guidance, is now extremely important in order to save the life of vital organs and, perhaps, the life of the patient. **

The Naked Radiator

by Frank Hubbell

(This is the first in a series of articles concerning the environmental emergencies: Hypothermia, Frostbite, Heat Stroke, Heat Exhaustion. Hypothermia will be presented in two parts. The first will discuss thermoregulation, and the effects of hypothermia. The second article will deal with the prevention, recognition, and treatment of hypothermia.)

In order to understand these environmental emergencies, and how they affect us, we need to appreciate several things: what we were designed for, what environment we belong in, how our thermoregulatory system works, and how it fails, and finally how these stresses affect our brain.

Some animals' survival is based on their physical prowess, their ability to run down another animal or outrun a predator. Humans rely upon mental prowess, not physical; we cannot outrun, out-fly, out-swim, or out-climb other animals. We survive by "out-thinking" other physically stronger animals.

Human beings are warm-blooded, social animals. But, like all animals, over the eons of time, we evolved, specialized and adapted to fit a specific niche in nature that would allow us to survive as a species with minimal competition from other animals and minimal risk of being eaten by another evolving species.

One of the many pressures on us as we evolved was environment, itself. We had to develop a thermoregulatory system that would maintain a constant core temperature of 98.6 degrees F, the temperature at which our brain functions best. The vast majority of our time on this planet has been spent near the equator, in the tropical and subtropical environments. It has only been in very recent history that we have moved north and south into cooler climates.

As a result of evolving in a consistently warm environment, we developed an extremely efficient cooling system and early warning system to protect us against over-heating. But because of limited exposure to the cold, our thermoregulatory system did not develop an early warning system against a falling core temperature or efficient defenses against the cold.

If we were a cold-adapted animal, our physiology and body build would be quite different. We would have shorter fingers and toes to conserve heat, a layer of adipose tissue (fat) surrounding our bodies to insulate against the cold and store energy, and we would be covered with a thick, plush coat of fur.

But, we are not. Instead, we are designed to be lean, with minimal fat, with long fingers and extremities and with minimal body hair, and minimal adipose deposits. Basically, we are built as naked radiators designed to lose heat, not conserve it.

Despite this, we find ourselves distributed in a wide variety of climates with the ability to move from one area of the world to another quickly, much faster than evolution can adapt us.

Our thermoregulatory system maintains a constant core temperature of 98.6 degrees F, the temperature at which our brain and body work at maximum efficiency. In order to do this, the system has to have a thermostat, a center that monitors our core temperature; a heating system, the basal metabolic rate, that it can turn up or down, and a means of getting rid of excess heat, a radiator, our skin.

Within the brain is an area that is dedicated to monitoring our core temperature by checking the blood and carrying it to the surrounding environment through nerves in our face. This allows the brain to balance heat loss versus heat production.

The primary organ of thermoregulation that the brain uses to control the rate of heat loss is the skin. If we begin to overheat, the thermoregulatory center will stimulate the sweat glands to produce sweat and the capillary beds to dilate, bringing more blood out into the skin where it can be cooled by the evaporating water (sweat).

If we begin to cool down, loose heat faster than we are producing it, then the thermoregulatory center will vasoconstrict, close down the capillary beds in the skin, thus limiting the amount of heat lost from the blood and body core. If that is not enough and we continue to lose heat, then we have to increase the rate at which we are producing heat by increasing our basal metabolic rate and by shivering. Shivering is muscle activity or exercise with the sole purpose of expending energy to produce heat.

Associated with the thermoregulatory center is an early warning center that tells us our core temperature is changing. In the case of over-heating, it tells us to slow down, seek out shade or a cool area, and drink lots of water. In the case of losing heat, it gives us a sensation of being "chilly," but that is all. Because of our evolution in the warmer latitudes, our thermoregulatory system is balanced unevenly; it favors over-heating, not over-cooling. As a result, we are predisposed to the cold environmental emergencies - hypothermia and frostbite.

Hypothermia is a condition where the core temperature falls as the result of losing heat faster than we can produce it. As was mentioned earlier, our brain functions best at 98.6 degrees F. As the core temperature drops and the brain cools, its functions become severely impaired and our survival threatened.

(Continued on page 4)

Radiator . . .

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As we evolved, our brains evolved, becoming ever more complex. The basic, oldest part of the brain is the brain stem buried deep inside on the upper end of the spinal cord. Within the brainstem exists all the rudimentary essentials for life: the respiratory center that controls our breathing; the cardiovascular center that adjusts the heart rate; the thermoregulatory center that adjusts the core temperature, and the reticular activating center that determines our level of consciousness.

Surrounding the brain stem is the limbic brain; in it exists the basic drives essential for a species to survive, from survival instincts and primitive behaviors to our sex drive. On each side of the limbic brain are the large complex cerebral hemispheres, our newest brain. In it exist the controls of gross motor coordination, the ability to stand upright, walk, fine motor coordination, the ability to make tools, use tools, build fires, and, finally, the areas of abstract thinking, conceptualizing, and judgment.

It is our level of judgment that allows us to weigh risks, to decide if it is safe to go on, if we are prepared or should we go back. Without this protection, our judgment, we are courting disaster. This is the real threat of hypothermia; this is why when people become hypothermic, they do stupid things - they wander off the trail and become lost; they don't stop to put on more layers as the sun goes behind the mountain and the temperature drops; they don't stop to put on waterproof clothing if it begins to rain or snow; they don't eat or drink. Worst of all, they become apathetic about themselves and those around them.

It was because of our intelligence that we have been able to develop clothing that allows us to create a warm micro-environment to carry with us. But we have to maintain that warm environment to maintain a normal core temperature to protect our brain.

Normal core temperature is 98.6 degrees F. The first overt sign of hypothermia is a constant fine shivering that begins when a core temperature of 96 degrees F is reached; shivering is involuntary exercise designed to produce heat through purposeless work. It is our primary defense against a falling core temperature. But somewhere between 98-96, our brain has already begun to fail, and our level of judgment is gone. That is why the cold, shivering hiker or skier doesn't do anything about it. It is that highest level of intelligence, judgment, that reminds them to go back, seek shelter, eat, put on a warm hat, additional clothing, etc. Someone else has to do it for them; someone else has to remind them to put on a hat and parka, to eat, or make the decision to go back.

For those of us who survive and thrive in the winter environment, we have to constantly remind ourselves that we don't belong there, that we belong in a warm, tropical setting, that we have to maintain a warm microenvironment to maintain a core temperature of 98.6 degrees F to keep our brain working properly because without it, little problems can rapidly become life-threatening crises. It is not a cold body that gets us into trouble, it is a cold brain. This is why hypothermia is considered to be the number one cause of people getting lost, benighted, injured, or killed in the backcountry.

To be safe and enjoy your adventure, you have to keep your brain warm.

Center Nervous System & Effects of Hypothermia

CNS Function	Hypothermia	Degrees F	Overt Signs of Hypothermia
Cerebral Cortex:			
• Judgement	----Loss of Judgement	-97-	Apathetic; unable to solve simple problems
• Fine Motor Core:			
- Hands	----Difficulty Using Hands	-96-	Shivering; inability to do simple tasks; slurred speech
- Speech	----Slurring of Speech	-96-	
• Gross Motor Core:			
- Walking	----Stumbling	-94-	Shivering, tripping, stumbling; doesn't brush snow off
- Balance	----Falling	-94-	
Limbic Brain:			
Survival Instincts	----Loss of Desire to Live	-92-	Increased shivering; may become belligerent; crawling (unable to walk)
Primitive Behaviors	----May Become Aggressive	-92-	
Sex Drive	----Loss of Sex Drive	-92-	
Brain Stem:			
Reticular Activating Ct.	----Loss of Consciousness	-86-	Convulsive shivering -- shivering fails = Metabolic Icebox: Unconscious, unresponsive, appears pulseless, breathless, dead
Thermoregulatory Ct.	----Loss of Thermoregulation	-80-	
Respiratory Ct.	----Decreased Respirations	?	
Cardiovascular Ct.	----Decreased Heart Rate/Blood Pressure	?	

Autonomic Dysreflexia

by Ken Thompson

In the last issue we explored the medical problems of individuals with spinal cord injries. This article deals specifically with one of those problems, autonomic dysreflexia. (You will also see it listed as sympathetic hyperreflexia or autonomic hyperreflexia. All three forms are acceptable.) By any name, the condition is a life-threatening medical emergency.

The autonomic nervous system comprises two divisions which have opposing functions, the sympathetic and parasympathetic systems. Generally, these two systems keep bodily processes (heart rate, blood pressure, and digestion, to name a few) functioning within tight limits. In addition, the sympathetic system activates in emergency situations. If a blood curdling scream disrupts your quiet camp in the pines, your heart rate will increase (carrying blood and oxygen to your fight or flight muscles), the pupils of your eyes will dilate (the better to see you with, my dear), and blood will be shunted away from your digestive tract (and sent to where it is needed, your brain and muscles). If you realize that the scream was only an owl, the parasympathetic system will take over and return your system to normal, you will gradually relax and will continue digesting your dinner.

Physical disruptions of the autonomic system can cause erratic functioning of sympathetic and parasympathetic responses. Stimuli, which ordinarily excite a response and then entice relaxation may continue building within the system, bombarding it with noxious impulses, until it becomes overloaded and, eventually, fails.

To understand hyperreflexia, imagine the way feedback occurs in an amplified sound system. When the system is operating as it should, each signal that enters the microphone travels through a cable to an amplifier and then exits through speakers, where it continues out into space. You hear feedback when the signal leaving the speaker is picked up again by the microphone and re-amplified. That short circuit continues until the ever strengthening signal finally overwhelms the system's ability to handle it.

Any excessive stimulation or combination of stimuli can casuse hyperreflexia. Some of the common culprits include: bladder infection; overfilling of the bladder; bowel impaction; ingrown toenails; over stimulation of the bowel during bowel care; over stimulation of the genitals during sexual activity; and labor and childbirth. The condition can also be brought on by trauma or virtually any intense stimulation to a susceptible individual's system.

Any person who has had a spinal cord injury that results in his having spasticity may be susceptible to hyperreflexia (spasticity usually results from injuries in the T-7 to T-10 range or higher). The intensity of the symptoms may vary with each patient, though may include: pounding headache; sweating, above the level of injury; slow pulse; goose bumps; flushing of the skin, especially on the head, neck and chest; high blood pressure; nasal stuffiness. If untreated, hyperreflexia can lead to stroke, coma, seizure, and death.

Initial treatment consists of trying to lessen the effects of high blood pressure on the brain. Position the subject with head up and feet down, and remove any restricting bands, ace wraps, or abdominal binders. In some cases you may be able to remove the cause of the dysreflexia. Most individuals will understand what has gone wrong: a blocked catheter or bowel impaction for example, and with your help can help themselves. But remember, the condition is life threatening, so begin thinking about an evacuation.

Sources of additional information on outdoor adventure for the mobility impaired:

Palaestra: The Forum of Sport, Physical Education, and Recreation for the Disabled, P.O. Box 508, Macomb, IL 61355.

Therapeutic Recreation Journal, National Recreation and Park Association, 3101 Park Center Drive, Alexandria, VA 22302.

Guidelines for Community-Based Recreation Programs for Special Pupulations, National Recreation and Park Association, 3101 Park Center Drive, Alexandria, VA 22302.

Handicapped Funding Directory, research Grant Guides, P.O. Box 4970, Margate, FL 33063.

The International Directory of Recreation-Oriented Assistive Device Sources, Lifeboat Press, P.O. Box 11782, Marina Del Ray, CA 90295.

Leptospirosis: Not a lot of Fun

by Dave Rosenberg

A handful of my Costa Rican river guiding colleagues and I recently played hosts to "the most common zoonosis in the world" -- Leptospirosis. This insidious microbe not only waltzed uninvited into our bodies to make our lives less than comfortable, but for several of us, the invasion returned for a second round. Cases of leptospirosis have been reported from all continents except Antarctica and are especially prevalent in the tropics. While not a very common disease in the U.S., between 1974 and 1983, 61 to 110 cases were reported annually.

Transmission

Leptospirosis is a term applied to disease caused by all of some 170 varieties of leptospira. Infection in humans is not essential to the survival of the leptospira. The disease occurs in a wide range of domestic and wild animal hosts, including cattle, possums, skunks, raccoons, foxes, and even dogs. The vector for transmission of leptospira is urine - humans can acquire the illness either through direct contact with infected urine, or tissue of an infected animal, or indirectly through contaminated water, soil, or vegetation. The usual ports of entry are abraded skin, particularly about the feet, and mucus membranes. This helps explain why leptospirosis has been considered an occupational disease - incidence is high in cattle farmers, water-associated agricultural workers such as rice farmers, motocross riders, and river guides (who may spend lots of time exposing their abrasions and mucus membranes to infected river water). In the outbreak in Costa Rica in the fall of 1990, at least eight river guides contracted leptospirosis, but only one client was known to have done so. Also, in each of the two previous rainy seasons (fall 1988 and fall 1989), at least two guides were diagnosed with leptospirosis. This may imply that extended contact improves your chances of joining the lepto club.

The vector for transmission of leptospirosis is urine - humans can acquire the illness either through direct contact with infected urine, or tissue of an infected animal, or indirectly through contaminated water, soil, or vegetation.

Clinical Manifestations

Leptospirosis is typically biphasic. In the leptospiremic or first phase, onset is usually abrupt. The cases in Costa Rica confirmed this - all who contracted the illness presented with nearly all of the common symptoms within 6 to 12 hours of initial onset! Symptoms in the first phase include severe headache, which is usually frontal and retroorbital, and photophobia; debilitating muscle aching and pain in the thighs and lumbar areas with severe pain on palpation; chills with high spiking fevers, as high as 104 degrees F; and excessive sweating. Other symptoms may include anorexia, nausea, and vomiting, depending upon the extent of the illness. Conjunctival suffusion (weepy eyes), which usually appears on the third or fourth day, may be lacking, but is more often overlooked. It may be associated with the photophobia. The first phase usually terminates after four to nine days. In Costa Rica, we found that wellness arrived within three to four days of the initiation of a course of antibiotics and bed rest.

The second phase, described as the "immune" phase, manifests more slowly than the first phase. After a relatively asymptomatic period of one to three days, the fever and other symptoms return, although with less intensity. The fever may even be absent. A fantastically itchy partial or full body rash may accompany this phase; in Costa Rica, only one poor victim (me) contracted a rash and it is not confirmed whether it was leptospirosis or something entirely different.

More serious problems may occur in untreated or advanced infections. These include Weil's syndrome, which includes jaundice and is thought to be toxic damage from the illness. Renal disfunction may include proteinuria, pyuria, and hematuria (excessive protein output, burning urination, and bloody urination, respectively). Serious renal damage may occur in the form of acute tubular necrosis associated with aliguria. Also, leptospirosis has been incriminated in cases of aseptic meningitis, pretibial "Fort Bragg" fever (a rash with 2-5 cm red lesions in the pretibial area), myocarditis, and other complications in children.

Diagnosis

Diagnosis requires a culture of the leptospira. Leptospirosis is commonly initially diagnosed as meningitis,

hepatitis, nephritis, fever of undetermined origin, influenza, toxic shock syndrome, and other non-specific malaises. Leptospiras may be excreted in the urine for up to 11 months after the onset of the illness and may persist despite antimicrobial therapy.

Prognosis

The prognosis is dependent upon both the virulence of the leptospira and the general condition of the patient. Between 1974 and 1981, the mortality rate in reported cases in the U.S. ranged from 2.5 to 16.4 percent, averaging 7.1 percent. Age is the most significant host factor. In a representative series, the mortality rate rose from 10 percent in men less than 50 years of age and 56 percent in men over 51 years of age. The virulence of the infecting leptospiras correlates best with the development of jaundice. Best not to turn yellow.

Prognosis is dependent upon both the virulence of the leptospira and the general condition of the patient.

Treatment

A variety of antimicrobial drugs, including penicillin, streptomycin, tetracyclines, chloramphenicol, and erythromycin have been effective in laboratory tests. We used doxycycline (from the tetracycline family) in Costa Rica with good success at rapidly reducing the fever and other symptoms in the first phase. Recommended dosage is 100 mg taken orally twice daily. Early bed rest is critical to recovery. Supposedly, doxycycline (200 mg taken orally once per week) is an effective prophylactic, but my experience demonstrated that it is, unfortunately, not 100 percent effective.

I recommend that if you will be traveling in high risk areas and performing high risk activities, such as boating or rice harvesting, you should check with local outfitters about the incidence of the illness and consider a prophylactic course of doxycycline. If you do present with the signs and symptoms of leptospirosis, especially back pain, sweating, and a debilitating headache, do not try to push through it - sleep early and often and get treated. **

Immunotherapy for Children Overused

Children who are mildly allergic to insect stings rarely develop worse reactions with subsequent stings and may not need the costly series of allergy shots often prescribed to ward off those reactions, according to Hopkins researchers.

In a study published in the December 6 issue of the **New England Journal of Medicine**, the researchers found that only 9 percent of children who had a widespread, skin-welt reaction to stings of bees, hornets, wasps, or yellow jackets developed any reaction whatsoever when stung a second time. None of the 245 children in the study had a reaction more severe than the initial welts that qualified them for the study.

Immunotherapy, or desensitization treatment with insect venom shots, is so effective in preventing reactions (97 percent) "that the tendency was to treat everybody based on the belief that worse reactions might follow mild ones," said Dr. Martin Valentine, professor of medicine at the Medical Institutions and lead author of the study. "But we were concerned about over-treatment, and set out to find some way of finding out who needs therapy," he said. No long-term effects from venom immunotherapy have been observed since its first use in the early 1970's, but the cost can reach thousands of dollars each year.

Surprisingly, said Valentine, the study revealed a very low rate of repeat allergic reactions to stings among children who received no preventive treatment. "This goes against the popular myth that, in children, reactions to stings will get worse over time," said Valentine. In fact, previous studies indicate that kids may often grow out of their allergic reactions to stings.

"Immunotherapy is terrific when needed, but clearly it's needed less often than previously thought," said Valentine.

(from The Johns Hopkins University Gazette, January 7, 1991) **

Wilderness Medicine Institute, Inc.

From the ancient granite of the White Mountains of New Hampshire, SOLO's nationally recognized wilderness medicine curriculum has moved to a second home high in the sprawling youth of Colorado's Rockies. Over the past fourteen years, SOLO has grown to become the premier source of wilderness medical training. Within the newly-built log walls of the Wilderness Medicine Institute, Inc., the same well-known instructional experiences and certifications are now readily available to the western states.

For more than five years, Buck Tilton and Melissa Gray, chief instructors for WMI, Inc., have taught full-time for SOLO, providing courses that include the four-week Wilderness EMT, the two-week Wilderness First Responder, and the weekend Backcountry Medicine (Wilderness First Aid). The list of nationally respected programs who contract our services includes NOLS, Outward Bound, National Forest Service, Student Conservation Association, Audubon Expedition Institute, and the Santa Fe Mountain Center. We will teach, at your site, one of the standard wilderness medicine curricula, or we will custom design a course to meet your particular needs.

WMI is planning a special Wilderness First Responder course March 16 - 24, 1991. Located at 9200 feet in the heart of the Rockies, the Pitkin Hotel, "a step back in time," provides an ideal setting for the course. Ninety minutes from Crested Butte and Monarch Pass Ski Areas, Pitkin borders the Gunnison National Forest where backcountry skiing abounds. Lodging is hostel-style ($8/night) and meals ($10/day) are traditional fare.

The cost of instruction, textbooks, handouts, and exam fees is $300. A discount will be given to WEA members.

For more information:

Wilderness Medicine Institute
P.O. Box 9
Pitkin, Colorado 81214
(303) 641-3775.

SOLO Wilderness and Emergency Medicine Seminars--1991

Course costs:

- Wilderness First Responder (10 days): $625
- Wilderness EMT (one month): $1125

Residential courses include lodging, meals, all instructional materials, textbooks, and examination and certification fees. Costs may vary for courses at sites other than SOLO.

Wilderness First Responder

- March 24 - 14 (Nantahala Outdoor Center, North Carolina)
- March 16 - 24 (NCOBS, North Carolina)
- April 8 - 19 (SOLO)
- April 15 - 26 (Appalachian Mountain Club, New Hampshire)
- May 20 -31 (SOLO)

Wilderness Emergency Medical Technician

- April 8 - May 3 (SOLO)
- May 20 - June 14 (SOLO)
- July 29 - August 23 (SOLO)

Wilderness/Rural EMT Module

- June 24 - 28 (SOLO)

Designed specifically for EMT's and Paramedics, this module combines wilderness/rural issues with applications of emergency care and rescue. Reviewed and approved by State of NH in 1986 for continuing education credit. Cost $285 (w/lodging and meals).

Other Course Offerings

SOLO offers a variety of courses in rescue, including High Angle, Advanced High Angle, and Water Rescue.

Backcountry Medicine, a 2-day course at the basic level, has been a favorite of college outing clubs and other organizations since 1975.

SOLO offers nationally registered ALS courses through the paramedic level as well as special short workshops on specific emergency medicine topics.

For more information, you can reach SOLO at:

SOLO
RFD 1, Box 163, Tasker Hill
Conway, New Hampshire, 03818
(603) 447-6711

Wilderness Medicine

Bookshelf

Travelers' Medical Resource

by William W. Forgey, M.D.

reviewed by Ken Thompson

Most of us will never travel enough to use even a fraction of the information contained in this weighty volume. But, if you are planning a trip anywhere outside the United States, you will probably find the **Travelers' Medical Resource** worth its $19.95 sticker. It certainly does not make for riveting reading, nor will it teach you sophisticated medical procedures like how to remove your appendix using only a razor blade and a bottle of Scotch in the middle of a herd of stampeding wildebeests. It is reference manual, plain and simple. Perhaps the fairest and most useful review I can provide is to catalog the wealth of information it contains. So here goes.

Section One provides a thorough introduction to the basics of trip planning and lists other books and resources related to safe traveling. Section Two lists the names, addresses, and telephone numbers of various governmental and private organizations who provide safety-related travel services. Readers are directed to organizations which provide pre-trip planning advice, immunizations, insurance, protection, overseas assistance and evacuation services. Section Three instructs travelers how to make their journeys as safe and comfortable as possible. Topics include reducing the effects of jet lag, controlling the fear of flying, avoiding terrorists, and surviving disasters. One chapter examines the causes of foreign travel mishaps and acquaints the reader with conditions that should be avoided.

In Section Four, readers learn how to cope with diabetes, cardiovascular, and pulmonary problems. Pregnant travelers and those with mobility impairments will also find useful information. This section contains a list of countries that require proof of a negative AIDS antibody test before they will grant you an entrance visa. Section Five is concerned with disease prevention and immunization. It deals with food, water, dairy products, and disease vector control. Required and recommended immunizations are described, along with dosage schedules for individual vaccines and for the occasional necessity of receiving several series. The vector control chapter discusses various insects that are of medical importance in spreading disease and how to avoid them.

Section Six catalogs over 70 contagious afflictions. It describes their distribution, causative organism, method of spread, pathology or damage caused to humans, availability of protective medications or immunizations, availability of treatment, symptoms, and the chance of delated manifestations of illness.

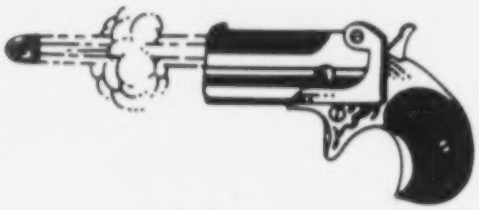
Section Seven, "Travelers' Self Care Manual," is a book within a book. This section is designed to travel with you and can be photocopied or purchased as a small volume for $6.95 from ICS Books. It is a first aid manual that includes medical kit recommendations and advice on when self care is appropriate and when to seek professional medical assistance. It includes special forms so that you can customize your book to suit your personal medical history and destination.

Section Eight is the Herchmer Country Database, a compilation of health and safety related information for all 219 (at the time of publication) sovereign countries of the world. Information includes immunizations that are both required and recommended; warnings about specific health hazards; an evaluation of the general safety of food, water, and dairy products; malaria hazard evaluation; and ways to contact local U.S. and Canadian representatives. You'll also find Department of State Travel Advisories. You can acquire updated information by calling phone numbers listed in the book, a welcome feature given the current political climate.

This comprehensive, 894 page reference manual is well-indexed and easy to use. Anyone engaged in or contemplating international travel, especially those planning for trips to remote areas, will want to consult the **Traveler's Medical Resource.** **

WMN Dispatches

Getting the Lead Out



Hunters and others who frequently handle firearms may be getting unsafe levels of lead dust in their bloodstreams. Epidemiologists in New Mexico and Colorado found that police recruits who practiced firearms training for 1 1/2 hours a week had eight times more lead in their systems than when they began the course, a result of fired guns belching out lead dust. While lead poisoning is most common in children--sometimes leading to retardation--it can lead to lethargy, sore joints, loss of appetite, and other ailments in adults. And it takes months for the body to purge itself of lead. The researchers recommend that, if you shoot frequently, protect against lead dust by using copper- or nylon-jacketed bullets instead of traditional, pure lead bullets.

Pitching In

The American Hiking Society is offering a 108 - page directory of 2,000 volunteer fobs called "Helping Out in the Outdoors," available for $5 from AHS/Helping Out, 1015 31st Street N.W., Washington, D.C. 20007. Among the jobs listed are fire lookouts, campground hosts, historical researchers, wildlife observers, and trail workers, drawn from all states.

Fatal Accident Rate Down

In the decade of the 1980's, the number of accidental deaths dropped by 10 percent. But the rate of accidental deaths, adjusted for population growth, fell by an average of 21 percent. Deaths in motorized vehicles, which accounted for almost one-half the total deaths, decreased by 20 percent. Accidental deaths in public places, including airplanes, fell by 22 percent. Drownings decreased by 39 percent, fire deaths by 33 percent, accidental deaths in the home by 16 percent. The National Safety Council credits better education, safety belts, child safety seats, and better-built vehicles among the reasons. They also credit improved emergency care. How this drop in death rate is reflected in the wilderness context is not known at this time.

Asthma Deaths on the Rise

Deaths due to acute asthma rose sharply in the '80's with an overall average increase of 6.2 percent per year since 1977. Why? Studies are inconclusive, but the evidence points strongly to the increase in pollution in urban environments. The increase in deaths due to asthma are restricted almost exclusively to large metropolitan areas.

Court Rules in Favor of EMT Training

Suits against education are usually unsuccessful. Complaints of "educational malpractice" rarely carry weight in court. But a recent case deserves attention to those who train others to deal with outdoor emergencies.

A northern California community college includes in its curriculum an EMT course with a rope rescue module. A student fell doing rope belay techniques, twisting her left knee, and requiring several surgeries. She sued. The question, of course, was whether or not the school was negligent.

The plaintiff contended the course materials (i.e. rope rescue) exceeded the "requirements of an EMT course" and that all EMT training should be "uniform." The court decided curriculums are designed to meet only "minimum standards" and, since the EMT's would be practicing in mountainous terrain, the rope techniques were appropriate. The court further stated that training programs should "retain the flexibility to train EMT students to meet the geographic challenges they will encounter in their respective environments."

The plaintiff further questioned the instructor's "qualifications to teach rope belay techniques." The court ruled training programs could use any instructor

who was "qualified by training and experience" to teach EMT students.

So the plaintiff argued she "did not intend to become an EMT." The court ruled there is "no distinction between a trainee who intends to become an EMT and one who does not."

Despite the fact that those of us who train for unusual rescues "won" this case, does it predict that more students will be challenging their training? In the December 1990 issue of JEMS, Carol J. Shanaberger, JD, gives some thought to the lessons offered by this suit:

1) Immunity statues can benefit training programs.

2) Attention to details such as careful curriculum development, deciding who teaches, and who approves curriculum and teaching methods, has a cumulative effect in establishing credibility and professionalism.

3) Failure to have a sufficient instructor to student ratio can lead to injury and subsequent lawsuit.

4) Failure to properly train students in the use of equipment before letting them use it may also invite injury.

Mosquito Warnings Lifted in Florida

Health officials in Florida have lifted warnings about encephalitis-carrying mosquitoes for 27 counties in which they had been detected. Officials said they were no longer advising against spending time outside at night in these areas but still were encouraging the use of repellent and long sleeves. They expect the mosquito threat to be gone as cooler weather and previous control efforts end the insects' life cycle. During the alert period that began in late summer, at least 153 confirmed cases were reported, and three people died.

Hearing Aid Attracts Lightning

Standing beneath an elm tree, a 20-year-old woman was killed when lightning struck the tree and leaped to the right side of the woman's head. CPR initiated by witnesses resuscitated the victim, and she left the hospital after one week with full recovery reported within three months. Five stainless steel screws, holding her hearing aid together, were vaporized by the strike and were concluded to be the main attraction for the lightning.

It seems that even small bits of metal near the head increase the risk of a strike. A July 1990 report in the **AMERICAN JOURNAL OF EMERGENCY MEDICINE** offers this advice: "Persons caught outside in a lightning storm can lower the risk of being struck by lightning by removing all metallic objects from their heads."

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Managing Editor: Kenneth L. Thompson, M.S., WEMT
Contributing Editor: Buck Tilton, M.S., WEMT-I/C
Features Editor: Frank Hubbell, P.A., EMT-I/C
Production Editor: Carolyn J.C. Thompson, M.Ed.

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The *Wilderness Medicine Newsletter* is intended as an informational resource only. Neither the WMN nor its staff can be held liable for the practical application of any of the ideas found herein. The staff encourages all readers to acquire as much certified training as possible and to consult their physicians for medical advice on personal health matters.

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Letters From Our Readers

(The text below is excerpted from a letter from subscriber Keith Conover. Dr. Conover is Clinical Assistant Professor, Emergency Medicine, University of Pittsburgh; Coordinator, ASRC-CEM **Wilderness Emergency Medicine Curriculum Development Project;** *and Chairman, Eastern Region, Mountain Rescue Association. We appreciate Dr. Conover's interest and are pleased to pass along his comments on several topics from WMN #25.)*

Dear Editor:

As a new subscriber to the Wilderness Medicine Newsletter, I find it interesting and educational. I'd like to make some comments on two articles in the last issue. First, in the article on "Tendinitis: Overdoing A Good Thing," Mr. Tilton recommends use of 800 mg of ibuprofen three times a day for tendinitis. I agree; I recommend this all the time to my patients with tendinitis. [Dr. Conover points out that this is dosage is different than the over-the-counter labeling instructions.] Higher doses of ibuprofen are well-known for causing asymptomatic ulcers, sometimes leading to life-threatening GI bleeds. In those who are exercising strenuously and becoming dehydrated (e.g. runners, climbers, backpackers) it may contribute to acute renal failure. When I tell my patients to take 800 mg TID of ibuprofen, I tell them not to take it for more than 10 days without another physician's evaluation.

Regarding Mr. Tilton's article on "Great Expectorations," I must again take issue. Dextromethorphan ("DM") is, indeed, most physicians' recommendation for patients with a cough that ought to be suppressed. (Not all coughs should be suppressed. With pneumonia or high altitude pulmonary edema, coughing clears secretions.) However, DM does have side effects. DM causes drowsiness, though not nearly so much as codeine and other narcotic derivatives used to suppress cough. And, regulatory agencies are now considering restrictions on DM's over-the-counter sale due to abuse in several areas of the country. For wilderness use, dextromethorphan-containing cough syrups are too heavy to carry. For wilderness medical kits, dextromethorphan is available in over-the-counter Hold cough drops, each with 5 mg of dextromethorphan (available from Beecham Products, Pittsburgh, PA 15230, 1-800-245-1040; 1-800-242-1718 in Pennsylvania). Prescription-only 30 mg sustained-release dextromethorphan tablets are available, too. (Humibid-DM: Adams Laboratories, Ft. Worth, TX 76118).

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Wilderness Medicine Newsletter

FOR THE RECOGNITION, TREATMENT, AND PREVENTION OF WILDERNESS EMERGENCIES

March/April, 1991 Volume 2, Number 2

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Management of Fractures and Dislocations in the Wilderness Environment

by Joseph B. Serra, MD

(Editor's note: This article involves the management of musculoskeletal injuries in remote settings where timely transport and hospital treatment are not available. It is directed not only to physicians involved in wilderness experiences, but also to trek leaders, expedition members, boatmen, and any paramedical personnel who might find themselves as the best qualified to aid a trauma victim. Dr. Serra, an orthopedist from Stockton, California is a member of the Board of Director's of the Wilderness Medical Society and the Advisory Board of the Wilderness Medicine Institute, Inc.)

Diagnosis and Treatment of Fractures

Managing fractures in remote environments requires common sense, good diagnostic skills, and sensitivity to the needs of the victim. For example, in a severe ankle sprain where a fracture is suspected, one would normally immobilize the part and put the victim on crutches with instructions for elevation, ice, and rest from weight bearing. In the backcountry, however, one must weigh other factors: the desire of the victim to ambulate on a suspicious ankle injury; the availability of people to transport the victim; the type of terrain involved in transport; the severity of the environment; and the victim's need or

(Continued on page 2)

. . . Fractures and Dislocations . . .

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desire to continue carrying a load. Thus, whereas the best medical judgment would preclude weight bearing, the best decision in a remote environment might be to immobilize the ankle in a splint and allow the victim to hobble along on his good ankle using an ice axe, ski pole, or wooden stick for balance. This could be the safest and most reasonable decision based on the situation.

Upper Extremity Fractures

In cold environments, perform the examination, as much as possible, by reaching beneath clothing that is left in place. Much can be gained by comparing the injured and uninjured sides. Immobilizing the arm against the body wall is nature's best splint, and many upper extremity injuries can be very adequately padded and immobilized in this manner with a sling and swathe. The hand and wrist should be free so that pulses may be monitored.

The Shoulder

Fractures about the shoulder girdle are quite often stable and require nothing more than sling immobilization, ice or snow or cold compress, if available, and allowance for gentle motion of the forearm and hand. A fracture of the clavicle may be treated with a sling or an improvised figure-of-eight that crosses behind the shoulders.

The Upper Arm

It is worth noting that the humeral shaft may be palpable on the medial (inner) side throughout its entire length. Therefore, when fracture is suspected, beginning either proximal or distal to the victim's area of complaint, palpate the shaft of the humerus. In this way, very small, non-displaced fractures may be identified. Checking radial nerve function is important in humeral fractures and is done by asking the victim to extend his wrist, digits, and thumb. Document the presence or absence of radial nerve function for future reference.

The Lower Arm

Fractures about the elbow, forearm and wrist should be adequately splinted, incorporating the joints above and below. If at all possible, splint the elbow at 80 - 90 degrees of flexion to elevate the forearm and hand and, thus, reduce swelling. Active exercise by the victim is quite helpful in promoting circulation. Do not flex the elbow more than 90 degrees, even if possible, because of the potential compromise of circulation. In grossly deformed forearm fractures, gentle traction to obtain better alignment for stable splinting is the appropriate and preferred treatment. Generally, no harm will be done by gently realigning a long bone fracture to a more anatomically aligned position. Applying a splint to a badly angulated forearm fracture is difficult and, most often, unstable. Gentle traction with an assistant applying counter-traction to the upper arm results in an overall improvement with a negligible risk of creating further vascular or neurologic damage. The stability provided by a solid splint is worth the effort, especially in a long and difficult transport. Peripheral pulses must be monitored before and after realignment. They should also be checked periodically to ensure that the splint wrap is not too tight.

Fractures of the distal radius and ulna may be adequately splinted in the position found unless there is a compromise of circulation. Place the hand in a position of function with a rolled up glove, sock, or other soft material tucked in the palm. Then immobilize the hand, wrist, and forearm in a splint. It is important to give the victim the responsibility of notifying you of any changes in sensibility or level of pain.

The Hand

Fractures of the hand are fairly common and often related to dislocations at the level of the proximal or distal interphalangeal (finger) joints. Phalangeal fractures should be reduced and splinted in a position of function, not in an extended (straight) position. Early after injury, these fractures can be reduced with only minimal discomfort. Hours after the injury, swelling and pain make realignment more difficult. Use of an ice compress and very gentle traction can realign these fractures of the hand without significant discomfort. When immobilizing the digits, keep them in a position of function, whenever possible, and use adjacent digits for splinting, when appropriate. However, consider the need to have normal digits available for use when making this judgment. When splinting the entire hand is advisable, a suitable splint may be made by placing the entire hand in a functional position with an Ace bandage or a suitable similar sized material in the palm of the hand and then wrapping the entire hand with an Ace bandage or Kling dressing. Torn strips of clothing can be used for an improvised hand splint.

Lower Extremity Fractures

Fractures about the hip and femoral shaft present major problems in wilderness medicine, primarily due to the inevitable transport problem and the necessity to maintain adequate traction for extended periods of time, as in the case of a femoral shaft fracture.

The Hip

First of all, in fractures of the hip, the typical position of external rotation and shortening may or may not be present. The fracture may be an impacted femoral neck type or an acetabular fracture (a fracture of the socket portion of the hip). Differential diagnosis might be difficult. As a general guideline, if a victim has sustained significant trauma and has painful motion in the region of the hip, plus pain with weight bearing, anticipate carrying him or her out on a litter or sled. Suspected fractures about the hip and pelvis need not be placed in traction, which is difficult to maintain and very often not necessary.

The Pelvis

In suspected fractures of the pelvis, it is imperative that the victim be observed for pending shock due to the significant blood loss often associated with these fractures. Because of the possibility of bladder trauma, check the victim for hematuria (blood in the urine).

The Femur

Fractures of the femoral shaft require traction. In a major expedition or in an extended trek in remote regions, the expedition doctor or paramedical person in charge should plan ahead for the type of traction that will be utilized if a femoral shaft fracture should occur. There are commercial traction devices available which are lightweight, easy to apply, and fairly efficient. Improvising femoral traction can be satisfactory, but should definitely be practiced prior to the actual event so that everyone understands and is familiar with the plan (see WMN #19 for a description of an improvised splint). The fracture of the femoral shaft must be treated in traction for many important reasons. The most important is that traction re-establishes normal length and conformity of the musculature and this tends to tamponade the bleeding which occurs in the thigh. A victim with a femoral shaft fracture can easily lose more than a liter of blood and, if the fracture is movable and the thigh unstable, this bleeding can continue. In addition to that, the fracture fragments may cause further vascular damage. The additional reasons for femoral traction include the relief of pain, stability of the fracture fragments, prevention of converting a closed fracture to an open one, and reduction of further soft tissue damage. Once a fractured femur has been diagnosed, someone should be assigned to apply manual traction to the extremity with the patient protected against the environment until the traction device is in place. A general rule of how much traction to apply is 10 percent of the victim's body weight or until the pain is relieved. Additional immobilization of the fractured extremity to the uninjured leg with adequate padding can also be quite helpful. When long transport is anticipated, place padding behind the knee to create 5 to 10 percent of knee flexion because this will make the extremity much more comfortable than if the knee is fully extended in traction. Frequently monitor and document circulation distal to the injury. It is not necessary to remove the shoe and sock in most instances. The dorsalis pedis pulse (located on top of the foot near the bend of the ankle) can be palpated within the sock and, also, a gross determination of sensation and skin warmth can be made by palpation. The victim can relate the sensation of numbness or tingling in the toes, if this should occur. The determination to remove footwear should be left to the person in charge and should be based on consideration of all pertinent factors (see WMN #24).

An extended transport over very uneven terrain is extremely difficult and requires, at the minimum, six to eight people to alternate in carrying the victim and also to carry packs and equipment. Therefore, if there is a reasonable alternative, including helicopter evacuation, it should be strongly considered.

The Knee

Patellar fractures may result from a fall directly on the knee and may be difficult to differentiate from a severe contusion unless there is an obvious deformity. Therefore, a victim with such an injury should be immobilized in a cylinder type splint from groin to ankle and may be permitted to walk with assistance, if terrain and other factors dictate that this is the best course of action. An Ensolite pad wrapped about the knee and taped in place makes an excellent cylinder splint to immobilize injuries about the knee.

The Lower Leg

Tibial fractures require adequate splinting, but no traction. Angular deformities should be gently corrected to allow more stable splint immobilization. Splint materials could be anything from air splints to materials mentioned earlier. In an open fracture with marked deformity, the best approach is to gently cleanse the protruding bone ends with any antiseptic available or even plain soap and water. A sterile bandage or the cleanest available material should be placed over the wound and the fracture then treated as a closed fracture would be, insofar as the application of a splint is concerned. Broad spectrum antibiotic therapy is indicated, if available. The point here is that correction of gross angular deformity and adequate splint immobilization takes precedence over concern regarding protruding bone ends. (Editor's Note: At the NOLS Wilderness Education Conference, September, 1990, Dr. Serra mentioned that the bone ends often slide back under the skin during realignment and this should not be a major concern during extended treatment of an open fracture.)

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The Ankle

Fractures about the ankle may be difficult to assess. Early examination and treatment are important. Take all steps possible to adequately immobilize, then elevate and apply ice, cold water or snow to the injured extremity to prevent excessive swelling. A well-wrapped compression dressing is also quite helpful. In fracture-dislocations of the ankle, early gentle reduction of the deformity is extremely important and most often quite easy to do. Simply holding the foot and applying gentle traction to the heel using the victim's leg as counter-traction can greatly improve the deformity. The sooner this is done, the better. Therefore, it should be done by anyone who understands the advantages and is comfortable with trying to improve the position of the fractured ankle. Basically, the damage has already been done by the fracture-dislocation and, therefore, any attempt at improving the position will have a beneficial effect on circulation. This also makes splinting more stable and comfortable. Fractures in the ankle area may be splinted very well with a down parka or other comparable gear which can be pinned in place, having the effect of a pillow splint.

Dislocations

The definition of a dislocation is disruption of the normal relationship of a joint. There are subluxations which are a result of partial disruption and resultant position changes in the bones and there are also complete dislocations. Our concern is with the more obvious complete dislocations of joints. These are more easily identified and more incapacitating to the victim. It is extremely important to be able to diagnose and reduce a dislocation as quickly as possible after it occurs in the unique situation of a mountaineering accident. Fellow mountaineers and others who travel in remote environments should learn to identify and manage the commonly occurring dislocations. Discretion must obviously be used when evacuation to a nearby medical facility can be easily accomplished.

Some of the major advantages in early reduction of dislocations are:

- Reduction is easier immediately after injury, before swelling and muscle spasm have developed.
- Transport of the victim is easier after reduction.
- Reduction most often results in dramatic relief of pain.
- Immobilization of the injured joint is easier to accomplish and more stable after reduction.
- The safety of the entire party may be jeopardized during the evacuation of a victim with a major joint dislocation.
- Early reduction reduces the circulatory and neurological risks to the extremity.

There are many signs which may be helpful in identifying a dislocation. The major joints that we will cover include the shoulder, elbow, wrist, hand, hip, knee, patella, and ankle. Remember that when a joint is dislocated, there is nearly always restriction of motion through its normal range; there is often obvious deformity in comparison with the uninvolved side; crepitus or grating of bone fragments is absent. There is very often a typical, identifiable posture of the dislocated joint, which the victim will maintain to minimize the pain. Obtaining a history of the mechanism of injury can also be helpful and will be discussed below for individual joints.

A note of assurance: Do not be concerned about causing additional damage to any fracture with a dislocation. Avulsion fractures may accompany dislocations. These fractures will most often be improved in alignment with the reduction of the joint. The same is true of vessel or nerve impairment associated with a dislocation -- reduction will reduce the impingement to these structures, as well.

When a major long bone (such as femur or humerus) accompanies a dislocation at the hip or shoulder, the dislocation may not even be diagnosed in view of the more apparent major fracture. In these cases, splinting of the fracture is the main concern. The dislocation, for all practical purposes, is a secondary issue and usually not amenable to reduction by ordinary means.

Diagnosis and Treatment of Specific Joints

Shoulder

Outdoor travelers, particularly paddlers and skiers, often exert sudden force on an already extended arm, forcing the head of the humerus forward and downward. These anterior-inferior dislocations of the shoulder joint are the most common, accounting for over 90 percent of shoulder dislocations. The victim will usually be stabilizing the shoulder in the most comfortable position. Remember that the victim cannot bring the involved extremity across his chest to a position of rest. The upper arm will be held away from the body in various positions and cannot be brought into a sling type position. This differentiates a dislocation from a fracture of the humerus, in which instance the victim is invariably splinting the upper arm against his chest wall for comfort. The mechanism of injury is usually external rotation and abduction. The problem is often recurrent and the victim can identify the dislocation quite readily. Check circulation, motor and sensory function to the hand, and also sensory function along the outer aspect of the shoulder. Document findings.

Posterior dislocations of the shoulder are rare, composing not more than 5 percent of the total. In this instance, the upper arm and forearm will be held across

the anterior chest wall and attempts at externally rotating the upper arm away from the chest will be restricted and painful. The diagnosis is often difficult to make.

The best method for reduction is steady traction with the shoulder abducted (held away from the midline of the body) 90 percent, pulling straightaway from the body with counter-traction provided in the axilla (armpit) by an assistant. Be sure to pad the axilla and the antecubital region (elbow) to protect nerve and vascular structures during traction.

A second method is placing the victim prone (face down) and letting the arm hang down towards the ground with 15-20 pounds of weight secured to the hand. This method may be slow and relaxation is critically important, but the muscles will generally fatigue in time, and manual assistance by manipulation of the shoulder is helpful.

After the reduction, immobilize with two slings or comparable material. One sling supports the forearm horizontally in front of the body. The other secures the arm to the chest wall with a wrap around the body. Many materials may be used for this - clothing, rope, pack straps, bunji cords (watch the hooks).

Elbow

Look for obvious deformity when compared to the uninvolved side and restricted flexion and extension of the joint. Most commonly the olecranon (bony upper end of the ulna) will dislocate towards the rear and you will see the resultant bony prominence of the olecranon posteriorly.

Apply traction to the forearm in a partially flexed position with counter-traction applied to the upper arm by an assistant. Apply a slow, steady pull. The patient's ability to flex the elbow to 90 degrees is a sign of reduction. Remember that the joint may also be displaced medially or laterally and may require side pressure for realignment. Immobilize in a sling and swathe, as described for the shoulder. If reduction is not possible, splint in the position in which the elbow is found.

Wrist

Very difficult to differentiate from a fracture and often difficult to reduce. Therefore, splint immobilization is treatment of choice. Circulation and neurologic function to the hand is usually not compromised, but, if so, reduction should be attempted. Most common neurologic deficit would be median nerve involvement, resulting in numbness over the palmar surfaces of the thumb, index, middle and radial one-half of ring finger.

Fingers

Obvious deformity and limited function are the main diagnostic factors. Reduction of the common dislocations of middle or distal finger joints is best accomplished by maintaining the digit in partial flexion and actually pushing the dislocated base of the phalanx back in place while traction is being applied to the partially flexed digit. This is much more successful than attempting to apply traction to a straight digit.

There are two hand dislocations in which reduction is difficult, if not impossible, by closed means. The main one is dislocation of the metacarpophalangeal joint (where the finger joins the hand) of the index finger, and the second one the metacarpophalangeal joint of the thumb. The thumb is sometimes reducible closed, but the index metacarpal rarely, if ever. Make one attempt and then quit, immobilizing the joint in a functional position rather than persisting with multiple attempts.

Finger dislocations may be associated with skin disruption. A controversy exists as to management. I would prefer cleansing as thoroughly as possible and accomplishing reductions with the victim being placed on oral antibiotics, if available. This is to facilitate the victim's ability to continue on with the greatest degree of comfort. Individual circumstances will dictate the proper choice.

Hip

The majority of dislocations are posterior. The hip will be moderately flexed, internally rotated and adducted (brought across the midline towards the opposite leg). Any attempt to extend the hip for splinting or easier transport will be resisted by the victim and is mechanically nearly impossible to accomplish. The mechanism of injury is a fall in which the hip is flexed and the impact is transmitted longitudinally through the knee, driving the femoral head posteriorly from the acetabulum (hip socket). The mechanism would be similar to that sustained in a dashboard injury in a motor vehicle accident. A climber may dislocate a hip in a fall as he makes contact with a rock wall upon reaching maximum rope length and swinging back into the rock face. Remember the typical posture of the posteriorly dislocated hip, which should make it easy to differentiate from a fracture of the proximal femur or shaft. Anterior dislocation of the hip results in a posture of extension, external rotation and abduction (the thigh is held away from the midline of the body). Again, attempting to extend the hip to a neutral position would be most difficult, if not impossible, and resisted by the victim.

Here the use of IV Valium and intramuscular or intravenous analgesics will greatly facilitate the reduction. This reduction requires two people, ideally, with one applying counter-traction to the pelvis with the patient lying in a supine position on the ground. The involved hip and knee are flexed to 90 degrees with the rescuer straddling the victim and applying traction in an upward direction. If only one person is available to attempt the reduction, the victim can be placed prone over a log, rock, or bench, and the traction applied downward with the hip and knee flexed 90 degrees. Once reduced, the injured hip must be splinted and

immobilized to the uninvolved extremity and the patient transported in a supine position.

Patella

Most often laterally displaced with the knee held in flexion for comfort. Often recurrent and due to pivoting type of injury with partially flexed knee. The patella is not movable and obviously out of place.

Apply gentle traction to extend the knee while applying direct pressure to the patella from the lateral side, thus pushing it back into the groove. Often as the knee is extended, the patella will reduce itself. Immobilize the extremity from ankle to groin in a splint. With the knee extended and immobilized in a splint, the victim will most often be able to walk well enough for evacuation. An ice axe or ski pole is a helpful crutch.

Knee

A disaster at best. Major ligamentous disruption is the rule. The knee may not be dislocated at the time of exam, but gross instability is the major clue, vascular impairment a major complement. Check pulses and motor function in ankle and foot.

Applying gentle traction to realign the joint as well as possible will benefit damaged neurovascular structures. Splint as securely as possible, making sure not to compromise circulation to the foot. Victim must be carried.

Ankle

Most commonly associated with fractures; obvious deformity; often grating or crepitus. Vascular impairment to the foot must be assessed by checking pulses, skin color and coolness.

Important to reduce the degree of deformity as much as possible. Ordinarily not difficult due to the gross instability resultant from associated fractures. Often, simply holding the forefoot and allowing the remainder of the extremity to act as the counter-traction will result in improved alignment of the ankle dislocation without much additional effort. Counter-traction by an assistant is helpful. Gentle traction of the heel and foot also helps. Check pulses before and after. Immobilize with air splint, if available; otherwise improvise with a pillow type splint made with down parka, extra vest or sweater; pin or wrap securely in place. Victim must be carried.

Conclusion

When reducing dislocations, try to have as many factors in your favor as possible. Utilize other party members where necessary; communicate with the victim very openly about what you are going to do; be very positive and deliberate in your approach; don't be concerned about causing more damage. There is nothing magic about reducing a dislocated joint and, in fact, if it's any consolation, not many centuries ago, reduction of dislocations was done by laymen, not physicians. The use of intramuscular or intravenous Demerol, Morphine, and Valium can make the job much easier. Gentle, but steady, and persistent traction is the rule rather than forceful jerking or ballistic maneuvers to reduce the joint. Remember that in most instances you will be dealing with friends who understand the necessity for your attempt and will cooperate the best they can. You and the victim have much to gain. **

Osteopathic Wilderness Medical Society

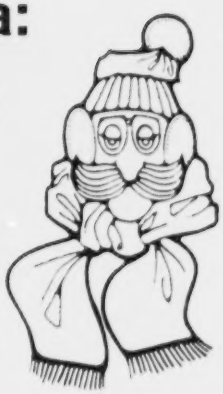
(from a letter to Buck Tilton)

The Osteopathic Wilderness Medical Society was formed to provide quality CME for Osteopathic physicians in an environment that promotes health, family, and a recognition of the importance wilderness plays as an integral part of our health as human beings. Our meetings attract an adventurous public, many of whom are not doctors, but find interesting and beneficial the information Osteopaths offer.

We have found a lack of understanding in the general public to the ways and doctoral beliefs of the Osteopathic physician. As a physician, the Osteopath is arguably the most advanced practitioner of health management. At times the need for medicine - drugs and surgery - is unmistakable. In other cases, the possibility of non-surgical treatments used in conjunction with medicine is the best method of cure. Most people have never heard of an Osteopath. We here about M.D.'s and Chiropractors, but rarely is there news about the doctor of both worlds. Through meetings and membership, we hope to increase the awareness of the Osteopath and show our support for each other and wilderness.

We have a commitment to the preservation of all forms of wilderness. This past year, under new leadership and a new name (OWMS arose out of the remains of the Northern California Osteopathic Medical Association), we were able to donate $2,000 to The Nature Conservancy. For 1991, our goals include the promotion of two meetings: Sea Ranch, CA April 19 through 21; and Yosemite, October 20 through 25. **

Hypothermia: Prevention and Treatment



by Frank Hubbell

The etiology and recognition of hypothermia and its significance for the outdoor enthusiast was discussed in the last issue of the WMN. Continuing with this topic, this article will examine the aspect of prevention of hypothermia.

As with all of the environmental emergencies, prevention is the key to success. Hypothermia is not simply a case of becoming cold, it is an incapacitating condition that impairs our judgment and hampers our decision-making processes. Because of these effects, hypothermia is considered to be the leading cause of mishaps, accidents, and fatalities in the backcountry.

Hypothermia is prevented by maintaining a normal core temperature of 37C (98.6F). But in order to maintain this constant core temperature, a balance has to be achieved between heat loss and heat production.

Heat Loss

Conduction is the transfer of heat from one solid object to another, with the warmer object losing heat to the colder object, making the warmer object colder and the colder object warmer until a state of equilibrium is obtained and both objects are at the same temperature. An example of this process would be the tired winter hiker resting on a boulder or an injured cross-country skier lying on the cold ground. Within a relatively short time both humans could cool off significantly. The rate of heat loss in these circumstances depends upon the amount and type of insulation between the two objects. Simply placing an ensolite pad between us and the cold rock or ground will minimize the rate of heat loss.

Convection is the transfer of heat from a solid object into the air or into the water. As we produce heat we not only keep ourselves warm but we also heat the air surrounding us. With nothing to stop or slow down the heat radiating from our bodies, we rapidly cool off. This form of heat loss is minimized by the loft or thickness of our clothing as well as the material of which it is made. Loosely woven fabrics will allow warm air to escape when it rises or when a breeze blows it away. A windproof layer over the lighter, loftier storage layer can help to prevent this.

Water, sweat, rain, fog, dew--anything that introduces moisture into the system increases the rate of heat loss tremendously. Materials such as wool, silk, and synthetics decrease this effect by minimizing the amount of water they can hold. The natural oils in wool repel water and the synthetics, being plastic, do not absorb much water in the first place. Cotton acts as a sponge, absorbing water rapidly and accelerating the rate of heat loss.

Radiation is the loss of heat via infrared radiation. Any object that is warmer than absolute zero (-273C or -491F) gives off infrared energy. The amount given off depends upon how warm the object is. The warmer the object, the more infrared energy it will emit. An example of this is when you are sitting across the room from a wood stove and you notice that the side of you facing the stove becomes warm and the side away from the stove does not. The infrared energy being given off by the stove is striking and warming the side of you that is facing the stove.

Although this form of heat loss is difficult to prevent, it is fortunately an insignificant problem for humans.

(continued on page 8)

One way to minimize this form of heat loss is to use a reflective surface (such as a space blanket) to bounce the infrared energy back to you. However, the vast majority of infrared energy will still escape through the space blanket.

Evaporation of water consumes large quantities of heat as the water goes from a liquid to gas. We are one of the few animal species that takes advantage of this principle to cool ourselves when we begin to overheat (but that is another article). Evaporation can work to our advantage to cause excessive cooling and heat loss.

As humans we are designed to lose heat when wet or damp. Accounting for 90% of our cooling efficiency, evaporation of sweat is also responsible for the most rapid form of heat loss for the outdoor enthusiast and is the leading contributory cause of hypothermia.

To prevent this form of heat loss we must either stay dry or we must wear clothing that minimizes the amount of water it can absorb and hold, such as wool and synthetic fibers. In addition, we should carry spare clothing (especially for the upper body) to change into as soon as we stop moving and producing excess heat.

Heat Production

Basal metabolism is the constant, never changing metabolism that is functioning right now in each and every one of us on the cellular level. It is the furnace that maintains our constant core temperature. If our core temperature begins to fall, the basal metabolism can be increased (i.e. the furnace can be turned up in an effort to keep our brains warm). Basal metabolism can be increased five-fold to dramatically increase heat production.

Nutrition and hydration, food and water, are both required to maintain the furnace. Simple sugar or carbohydrates are the logs on the fire. In order to keep the fire going we have to keep putting logs on the fire. This is accomplished by snacking often on carbohydrates or sweets.

Exercise produces an excess of energy through the metabolic action of the muscles working. When the muscles are working, the furnace is burning extra fast and hot. As a result, if the core temperature begins to rise, we will begin to sweat to help eliminate the excess heat and prevent overheating.

Shivering is a form of involuntary exercise that occurs when the brain perceives that we are losing heat faster than we are producing it. Most people begin to shiver at approximately 96F, at the same time the basal metabolism is increasing. If the core temperature continues to drop, the shivering will increase as will the basal metabolism in an effort to maintain our core temperature and keep the brain functioning well.

External sources of heat and warmth are simply sources of heat such as fire, hot water bottles, the sun, or someone warmer than you. External sources of heat can be very helpful in the prevention of hypothermia but are of little help in treating the hypothermia victim in the field.

Prevention of Hypothermia

With these concepts of Heat Production vs. Heat Loss, a set of principles for the prevention of hypothermia can be developed--principles to maintain or maximize heat production while minimizing heat loss in order to keep our brain warm and functioning at maximum efficiency.

WARMTH

W -- When wet get dry -- This is the single most important principle in the prevention and treatment of hypothermia.

A -- Attire -- Wear clothing make of materials that retain heat even when wet and carry extra dry clothing.

R -- Raingear -- Always carry a layer of windproof/waterproof raingear, even on short day hikes.

M -- Munch -- Maintain nutritional status, snack often on sweets and carbohydrates, you have to keep putting logs on the fire.

T -- Thermoregulation -- Dress in layers so you can vent and adjust layers to maintain a balance between heat loss and production.

H -- H20 -- Water, water, water. Drink lots of water. Dehydration is a major contributor to fatigue and hypothermia.

The old expression, "an ounce of prevention is worth a pound of cure," in the case of hypothermia should be, "an ounce of prevention is worth a life." A thorough understanding of our thermoregulatory system and its limitations is the most important knowledge for any backcountry enthusiast to have. The appreciation of our inherent physical limitations, as a species, is what allows us to be out in the wilds, enjoying all of its rewards without risk to life or limb.

(In the next issue of the WMN, we will discuss the treatment of hypothermia using the same principles of heat production vs. heat loss.) **

Whitewater Homework

by Les Bechdel

(Les Bechdel is the co-author of River Rescue and is considered one of the leading authorities of whitewater safety in the United States. He resides in McCall, Idaho where he leads wilderness trips on the Middle Fork and Main Salmon Rivers.)

Concerns for safety in whitewater sport can be divided into three areas:

1. **Preparation** - Before the season begins you must both physically condition yourself as well as research the rivers you are planning to go on.

2. **Equipment** - You need to acquire the proper clothing and gear to run the rivers.

3. **Skill** - You must learn appropriate techniques to negotiate the rapids safety, as well as learn rescue skills in the event of a mishap.

Since it is stfll winter in most parts of the country, this would be a good time to discuss how to get ready for whitewater. As with any other sport or activity, preparation is the cornerstone of safety. Now is the time to start your **WHITEWATER HOMEWORK**. Are you already a veteran of this fascinating sport? Or are you a neophyte just "getting into whitewater?" In either case, you should consider the following comments to prepare for the whitewater of spring.

Understanding Whitewater

Most Americans feel comfortable around water. Typically we know how to swim and more often than not, we have a working familiarity with boats. The trouble is that we tend to think of water as being static. A placid lake or quiet stream comes to mind with a boat moving on top of the water. However, with whitewater the river is moving as well as the boat. We need to appreciate the power of turbulent, moving water. This power is amplified by three factors: 1. The gradient of the river bed measured in vertical feet lost per mile, 2. Constrictions in the river bed caused by boulders or canyons, and 3. Increased flow rates measured in cubic feet per second (CFS). River runners grade whitewater difficulty from Class I (moving water with minor obstacles) to Class VI (definite risk of life, for experts only).

Physical Conditioning

Being in good physical shape will enhance your enjoyment of whitewater sport. This doesn't mean you have to be a marathoner or spend months in the weight room. Simple exercises and slow, gentle stretching will increase your learning curve and, as well, reduce chances of injury. Focus on your upper body, especially the lower back and abdominal muscle groups. Kayakers should pay attention to hamstrings, too. When it comes to that first day of paddling, don't forget warmup stretches before you launch!

Knowledge

Learn about the rivers before you run them. If this is to be your first whitewater experience, start out easy. Ask experienced paddlers or read guide books to discover good rivers for beginners. Experienced paddlers should do research if planning to try a new river. Find out where the gauges are located and what levels are considered safe. Obtain maps to determine put-ins, evacuation routes, and take-out locations. Use check lists to make sure you don't forget any essential gear. Know the shuttle routes! The safety of many a river trip has been compromised because of late put-ins.

A Natural Progression

Plan your learning process in a relaxed, logical sequence. Establish realistic goals. Learning a new sport takes a lot longer than you anticipate. Introduction to the boat and basic strokes should take place in a swimming pool or a lake. Whitewater concepts should be learned on moving water before getting into real whitewater. Be able to paddle in complete control on one grade of whitewater before advancing to the next. This natural progression allows a logical and safe education in whitewater for the paddler.

Whitewater is not supposed to be a death defying activity that brings terror to your soul. It is meant to be fun, rewarding and, if you do your homework, safe. **

Paddling Opportunity

You can join Les and a team of medical instructors as they paddle down the Middle Fork of the Salmon this August 30 - September 4. Learn wild medicine and wilder paddling with the experts. This trip is sponsored by Adventure Medical Seminars. If you would like details, you can write Les directly at P.O. Box 823, McCall, Idaho, 83638.

Wilderness Medicine Institute

Wilderness Emergency Medical Technician Course
At Western State College, Gunnison, Colorado
July 1-26, 1991

This course is designed for outdoor leaders, backcountry rangers, rural ambulance attendants, and other individuals who provide emergency care in remote settings. While fulfilling the DOT minimum requirements for certification, this 160-hour program expands the topics to address the issues involved in extended care and introduces backcountry rescue techniques. Special topics include: wound management and infection, realigning fractures and dislocations, improvised splinting techniques, patient monitoring and long-term management problems, up-to-date information on all environmental emergencies, plus advice on drug therapies. Emphasis is placed on principles of treatment and decision-making, not on memorization of lists.

Certifications: SOLO's Wilderness EMT, National Registry EMT-B, and American Heart Association's CPR.

Instructors: Buck Tilton and Melissa Gray of the Wilderness Medicine Institute, Inc. and SOLO Wilderness Medicine. For the past six years, Tilton and Gray have taught all level of wilderness medicine courses for such organizations as: NOLS, Outward Bound, National Forest Service, Student Conservation Association, National Audubon Society, and over two-dozen colleges, universities, and small outdoor programs.

Prerequisites: Participants must be at least 18 years of age and in good physical health. All levels of previous medical training and experience are welcome.

Tuition: The cost of instruction, textbooks, handouts, and exam fees is $550. A discount will be given to WEA members, Western State College students and Gunnison County residents.

Credit: Eight hours of undergraduate credit is available for an additional $187.

Lodging and Meals: Located in the heart of the Rockies, Western State College provides an ideal setting for the course. Double occupancy dorm rooms are available for $362 and three meals a day for $306. Prices are for the entire 26 days. There is a May 15 deadline for meals and lodging at the college. There are also abundant motels and camping spots in the vicinity.

Registration: Enrollment is limited. To reserve a space send your name, address, and phone number, course name and dates, along with a non-refundable $300 deposit to Wilderness Medicine Institute, Inc. P.O.Box 9, Pitkin, CO 81241.

For Further Information: Call (303) 641-3572. **

SOLO Wilderness and Emergency Medicine Seminars--1991

Course costs:
- Wilderness First Responder (10 days): $625
- Wilderness EMT (one month): $1125

Residential courses include lodging, meals, all instructional materials, textbooks, and examination and certification fees. Costs may vary for courses at sites other than SOLO.

Wilderness First Responder
- May 20 -31 (SOLO)

Wilderness Emergency Medical Technician
- May 20 - June 14 (SOLO)
- July 29 - August 23 (SOLO)

Wilderness/Rural EMT Module
- June 24 - 28 (SOLO)

Designed specifically for EMT's and Paramedics, this module combines wilderness/rural issues with applications of emergency care and rescue. Emphasis is on patient assessment and extended care using limited and improvised equipment. Reviewed and approved by State of NH in 1986 for continuing education credit. Cost $285 (w/lodging and meals).

EMT Intermediate
- May 6 - 17

The first phase in the development of a modular EMT - Paramedic program, covering several DOT EMT - Paramedic modules. Successful completion of this two-week (Mon. - Fri.) didactic segment, plus additional monitored clinical skills requiremtns will enable candidates to take the NREMT-I written and practical exams. Current EMT-B certifcation required. Cost $600 (includes lodging meals and materials).

Other Course Offerings

SOLO offers a variety of courses in rescue, including High Angle, Advanced High Angle, and Water Rescue.

Backcountry Medicine, a 2-day course at the basic level, has been a favorite of college outing clubs and other organizations since 1975. Now offered with certification in Wilderness First Aid. SOLO offers nationally registered ALS courses through the paramedic level as well as special short workshops on specific emergency medicine topics.

For more information, write to: SOLO, RFD 1, Box 163, Tasker Hill, Conway, New Hampshire, 03818. Or call: (603) 447-6711. **

New W-EMT Course

This W-EMT Course is offered by the Appalachian Search and Rescue Conference and the Center for Emergency Medicine of Western Pennsylvania. It is a 5-day continuing education course for EMT's and paramedics, emphasizing acute, primary, and long-term prehospital care of patients in the wilderness. EMT's with wilderness and disaster responsibilities will acquire knowledge and skills to manage medical problems far from the road. Wilderness EMT's care for their patients for extended periods in the hostile wilderness environment, and deal with common medical problems encountered by SAR team members in the backcountry.

This course builds on SAR and EMT training, teaching directed histories and physical examinations, how to diagnose and treat common simple wilderness problems, and how to care for a wilderness patient for up to 48 hours. How is this Wilderness EMT Course different? First, the training is specifically oriented to those doing wilderness search and rescue. This means that students are expected to understand both the wilderness and wilderness search and rescue as a pre-requisite. The second pre-requisite is EMT training. A solid basic EMT background is assumed. If you're wondering if you qualify, contact Dave Lindell: (302) 652-0361/home; (215)843-3001/work.

For more information, contact: Center for Emergency Medicine of Western Pennsylvania, 230 McKee Place, Suite 500, Pittsburgh, PA 15213-4904. RE: WEMT.

WMN Notes and Updates

If you have been trying to call Buck Tilton or Melissa Gray at their new business (**Wilderness Medicine Institute** in Pitkin, Colorado) **the correct phone number is (303) 641-3572**. The number is printed incorrectly in the previous edition of the WMN.

We forgot to mention that You can order Dr. Forgey's new book, **Traveler's Medical Resource** (reviewed in WMN Vol. II, No. 1), directly from ICS Books at One Tower Plaza, 107 E. 89th Avenue, Merrillville, IN 46410. The cost is $19.95 in U.S.A. and $26.95 in Canada.

World Congress on Wilderness Medicine

The Seventh Annual Scientific Meeting of the Wilderness Medical Society will be held July 14 - 19, 1991 in Whistler, British Columbia, Canada. Once again the WMS brings together most of the biggest names in wild medicine for a major conference. Galen Rowell will captivate with his presentation, Preservation and the Spirit of Adventure. Registration fees range from $375 to $575 depending upon your level of training. For more information: Janice A. Parr, Conference Coordinator, P.O. Box 460635, Aurora, CO, 80046, USA, Phone and Fax: (303) 699-2775.

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Managing Editor: Kenneth L. Thompson, M.S., WEMT

Contributing Editor: Buck Tilton, M.S., WEMT-I/C

Features Editor: Frank Hubbell, P.A., EMT-I/C

Production Editor: Carolyn J.C. Thompson, M.Ed.

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The *Wilderness Medicine Newsletter* is intended as an informational resource only. Neither the WMN nor its staff can be held liable for the practical application of any of the ideas found herein. The staff encourages all readers to acquire as much certified training as possible and to consult their physicians for medical advice on personal health matters.

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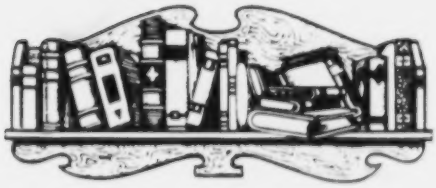
Wilderness Medicine



Bookshelf

Book Review:

High Altitude Medicine and Physiology

By Michael P. Ward, James S. Milledge, and John B. West

London, Chapman and Hill, 1989
534 pages, 100 illustrations.
$94.95

(reviewed by Buck Tilton)

"By far the best," says the **New England Journal Of Medicine**. "Quite simply the best medical text on high altitude," says the **American Alpine Journal.**

Although this book is written primarily for physicians, the information is excellent and understandable for almost anyone going into the mountains. And high doesn't mean an 8000 meter peak. Most of the problems occur among skiers, hikers, and climbers on much lower hills. The authors, three distinguished participants on many of the major expeditions of the past 30 to 40 years, place the latest research in a historical and geographical framework that is often lightened by humor. Many case studies are used. The reader learns things you'd never think to ask about respiratory physiology, and how the heart, blood and even the cells react to lower concentrations of oxygen experienced when the body goes higher. Hypothermia and frostbite are well-described, and a full and illuminating discussion of how thermal balance is controlled is included.

This book is written with a great sensitivity to the mountains and the people who live there. It is a tribute to the heroes who have led the way to extremes of altitude. It is good reading with an educational value far greater than its title implies.

Available from the University of Pennsylvania Press, P.O.Box 4836, Hampden Station, Baltimore, MD 21211.

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Wilderness Medicine Newsletter

FOR THE RECOGNITION, TREATMENT, AND PREVENTION OF WILDERNESS EMERGENCIES

May/June, 1991 Volume 2, Number 3

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A Community Of Disease

By Buck Tilton

Types of Infection

Unseen and ubiquitous, microorganisms live among us and on us and in us, and are responsible for the diseases of humanity. They are divided, generally, into world's of viruses, bacteria, fungi, and parasites.

Viruses cannot exist for long outside of living tissue, and must penetrate human cell walls to multiply and cause disease. They are unimaginably tiny, and account for the respiratory infections that are responsible for approximately one-half of all acute illnesses. Major viruses include influenza, the common cold, mumps, and measles. Some viruses set up housekeeping in the central nervous system and cause forms of meningitis and encephalitis. Herpes simplex virus type-1 causes cold sores and herpes simplex virus type-2 causes genital lesions. The Epstein-Barr virus produces infectious mononucleosis. Varicella-zoster causes chicken pox that may later appear as shingles. Viruses cause hepatitis and AIDS.

Bacteria grow independently without need for a host cell. Sphere-shaped bacteria include **Staphylococcus aureus** which lives on the surface of human skin and is responsible for nasty things like wound infections, abscesses, bacterial pneumonia, and some food poisonings. Some of the spherical bacteria grow in chains,

(Continued on page 2)

A Community of Disease

(continued from page 1)

called streptococci, and cause problems such as strep throat, scarlet fever, rheumatic fever and acute sinusitis. Rod-shaped bacteria are classified as gram-positive and gram-negative rods. In the gram-positive group is **Clostridium tetani** which lives in soil and causes tetanus. Many of the gram-negative group live helpfully in a normal GI tract, but this group also includes **Escherichia coli** which causes urinary tract infection and **Salmonella** which causes typhoid fever, and both produce diarrheal illness. Another gram-negative, **Shigella**, causes dysentery. Another group, the Mycobacteria, cause tuberculosis and leprosy.

Fungi are primitive life-forms that feed on living plants, decaying organic matter...and animal tissue. Fungal infections are usually bothersome but mild. In the immunosuppressed, a fungal infection called candidiasis can be overwhelming and fatal.

Parasites that cause disease in humans are protozoa that include the **Plasmodia** of malaria and **Giardia lamblia** of giardiasis.

Hepatitis B

300 people who provide emergency care for others are expected to die this year of hepatitis B, an inflammation of the liver, a disease communicated to them by their patients. Tragedy, yes, but even more sad is the result of a recent Gallup survey reported in the March 1991 issue of EMERGENCY: fully two-thirds of those who are infected on the job with hepatitis B know almost nothing about the disease, and one-half do not know a vaccination will prevent the infection. Almost one-third of those health care workers surveyed did not know the disease is spread by contact with blood and other body fluids, and almost 70 percent did not believe they were at risk every time they reached out to touch an ill or injured patient. Few knew that hepatitis B is many times more contagious than the HIV, the cause of AIDS (see below).

Fully two-thirds of those who are infected on the job with hepatitis B know almost nothing about the disease, and one-half do not know a vaccination will prevent the infection.

One estimate places the number of infectious carriers of the virus in the United States at one million. Hepatitis B will afflict approximately 300,000 this year, and 5000 of those will perish.

Twenty-eight to 160 days after contamination, the first signs and symptoms appear. These include loss of appetite (anorexia), unusual fatigue, discomfort in the abdominal area, a swollen liver, and an increasingly yellow tone to the skin (jaundice). Tests will disclose abnormal liver function. In a few cases, there are virtually no symptoms.

Since neither cure nor satisfactory treatment for hepatitis B exists, the vaccination is highly recommended. Both current vaccines are genetically engineered and contain only a portion of the virus's outer coat. They cannot result in infection. You might get sore at the shot site and develop a mild fever. Unfortunately, it costs around $120 for the series of three shots, which are given over an 8 month period. Health care workers are especially encouraged to be vaccinated, as are travelers to areas with a high incidence of the virus. The Center for Disease Control (CDC) has a travel-hotline for information on hepatitis B and other vaccinations: (404) 332-4555.

HIV

AIDS stands for **acquired immune deficiency syndrome**, a seriously life-threatening infection that destroys the body's ability to fight off other types of infections. AIDS is the final, completely fatal stage of a continuum of problems caused by the **human immunodeficiency virus** (HIV). Once the HIV is in someone's blood, they develop antibodies to the virus which will show up in a blood test. Seropositivity (testing positive for a certain antibody) usually shows up four to six weeks after HIV infection. It is communicated by the same blood-and-body fluid transmission as hepatitis B. Saliva, tears, sweat, urine, semen, vaginal secretions and stool can all carry the HIV, but only blood and semen have been known to transmit the virus.

Patients who have been infected, but have not yet developed the antibodies are considered to be in the first stage of the continuum. Stage two patients have the antibodies, but no symptoms of the disease. In the April 1991 issue of RESCUE, Jim Holbrook states "as many as 10 years may pass before the person begins to show clinical signs of HIV infection." Once signs and symptoms appear, the patient may still not be technically

classified as an AIDS sufferer. For awhile, this stage was called the AIDS-related complex (ARC).

But regardless of the stage of the disease, the HIV-infected patient can pass the virus on to the emergency responder!

Common Adult Diseases

Hepatitis B and the HIV are more "newsworthy," but certainly not the only risks.

Hepatitis A can be transmitted by blood, oral secretions and sexual contact. It produces fever, fatigue, anorexia, nausea, headache, and the possibility of jaundice.

Hepatitis non A- non B is a blood-borne pathogen producing signs and symptoms similar to hepatitis A.

Tuberculosis is an airborne pathogen causing fever, sweating, weight loss and coughing.

Pneumonia is another airborne disease producing fever and coughing.

Syphilis can be passed through blood contact, producing genital lesions and, later, nerve degeneration.

Meningitis (bacterial) is transmitted by direct contact with oral and nasal secretions. It causes a high fever, severe headache, stiff neck, and sore throat.

Rhinoviruses (common colds) are spread by all transmission means.

There are others.

Prevention

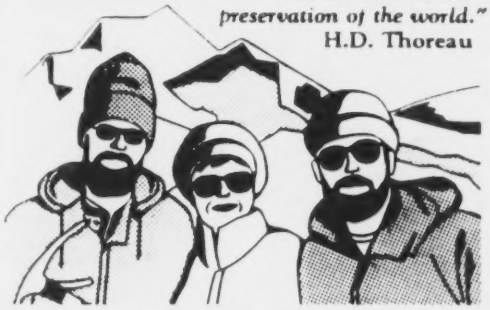
The obvious bottom line in the prevention of hepatitis, the HIV, and other communicable diseases is universal body-substance precautions with all patients. It is safest to disregard thoughts of "this is a high risk person" and "this is a low risk person." Consider all patients as potential transmitters of infectious disease. Prevention requires, more than anything else, a change in behavior on the part of the rescuer.

And keep in mind that the community of diseases, especially in the wilderness, are sometimes passed around a group by very casual means.

- Contact with blood poses the greatest risk, and disposable rubber gloves should be carried in wilderness first aid kits...and worn! Or, if the wound is minor, direct the patient in the cleaning of their own wound.
- Wash hands for at least 10 seconds with soap and water immediately after contact with blood or other body fluids.
- Wash soiled first aid gear and reusable bandages with soap and water and let them air dry. Or soak them for at least 30 seconds in one-to-ten solution of household bleach.
- Use a pocket mask with a one-way valve when performing mouth-to-mouth breathing.
- Double-bag in plastic soiled bandages and dressings if they cannot be completely burned in an environmentally safe, hot fire.
- Do not share handkerchiefs, toothbrushes, razors, water bottles, eating utensils, etc.
- Wash and let air dry all community kitchen gear.
- Wash your hands after you go potty.

In the wild places, seek a community of people, not a community of disease. **

"In wildness is the preservation of the world."
H.D. Thoreau



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W.E.A.

Treatment Of Hypothermia

by Frank Hubbell, D.O.

In the previous two articles on hypothermia, the physiology, prevention, and recognition of hypothermia were discussed. In this concluding article the focus will be on the treatment and management of the hypothermia victim with recognition and treatment being reviewed. I will introduce a couple mnemonic devices for those who find them a handy way of remembering.

When we lose heat faster than we can produce it, our core temperature drops; the resulting state is hypothermia. To help remind us of the signs and symptoms of a falling core temperature, think **COLD**:

C = Change In Mental Status

As our core temperature drops from 98.6 - 97 F, our brain begins to cool off, resulting in a change in mental status. This change can be seen in our decreasing awareness of the surrounding environment and a diminishing concern about ourselves. This apathetic state contributes to a loss of judgment often responsible for backcountry injuries and deaths.

O = Onset Of Shivering

As the core temperature drops below 96 F, the brain recognizes that we are losing heat faster than we are producing it. In an effort to re-establish the balance, the brain stimulates shivering, involuntary muscle activity intended to produce heat and maintain core temperature. If the core temperature continues to drop, the intensity of shivering will increase until the core temperature drops to 92 F, at which point the shivering mechanism begins to fail.

L = Loss of Coordination

With the onset of shivering, coordination begins to fail. Around 96 - 94 F, fine motor coordination becomes impaired, affecting the use of fingers and vocal cords. Performing simple tasks like zipping zippers or lighting stoves becomes difficult or even impossible, and speech becomes thick and slurred.

Between 95 - 92 F, gross motor coordination is impaired. The ability to use our arms and legs, to walk, ski, or climb is affected. We begin to trip, stumble, and fall with increasing frequency. Each time we get up we neglect to brush the snow off our clothing; we are completely apathetic about ourselves and others.

D = Doomed

As we become colder and colder we are less able to help ourselves. From 92 F and below, we are helpless, slipping towards unconsciousness, into the METABOLIC ICEBOX.

In the previous article it was stated that "an ounce of prevention is worth your life," and a mnemonic was introduced to help remind us of the principles of prevention of hypothermia, **WARMTH:**

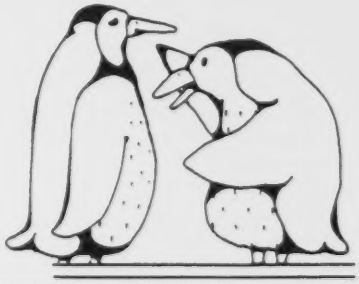
W = When Wet, Get Dry

A = Attire - Wear clothing that minimizes heat loss even when wet.

R = Raingear - Always carry raingear, tops and bottoms.

M = Munch - Snack often on carbohydrates, sugar = energy to burn.

If hypothermia isn't prevented, the cornerstone of therapy is early recognition and appropriate reaction to it. The sooner hypothermia is recognized, the easier it is to treat.



T = Thermoregulation - Dress in layers and adjust layers, ventilate, to maintain balance between heat production and heat loss. Stay warm and minimize sweat.

H = H20 - Water, water, water, stay well-hydrated.

If hypothermia isn't prevented, the cornerstone of therapy is early recognition and appropriate reaction to it. The sooner hypothermia is recognized, the easier it is to treat.

The victim has been losing heat faster than she has been producing it for some time, therefore, the principles of treatment and management are to minimize heat loss caused by conduction, convection, radiation, and evaporation and to maximize heat production by maintaining basal metabolism (logs on the fire = sugar) and exercise/shivering.

We minimize heat loss via conduction by getting the hypothermia victim dry and keeping her dry, and by insulating her from the ground. Convection is minimized by the wind/waterproof outer layer. Radiation heat loss can be decreased with the use of a space blanket, but the heat saved is minimal. Evaporation is minimized by keeping the victim and insulation dry and using a wind/waterproof outer layer.

Heat production is maximized by the basal metabolism and shivering mechanism. Both of which are accomplished by maintaining the blood sugar level.

Again, as with recognition and prevention of hypothermia, there is a mnemonic to help remind us of the principles of treatment and management of hypothermia, **REWARM**:

R = Recognition

Change in mental status = APATHY

Onset of shivering

Loss of coordination

Doomed, unable to help themselves

E = Environment

In order to successfully treat hypothermia you have to be in a stable environment. As soon as hypothermia is recognized you need to seek out or create shelter, a cabin, tent, bivouac, snowcave...

W = Wet, Wet, Wet

All hypothermia victims are wet. Once in a shelter, strip the victim out of their wet clothes. Get them dry and keep them dry.

A = Apply Hypothermia Wrap

Re-insulate the DRY hypothermia victim with DRY insulation to store the heat that she is producing. Wrap with a wind/waterproof outer layer, such as a plastic tarp, rainfly, or large garbage bags. Insulate from the ground with an ensolite pad, rope coils, or pine boughs. The trick to an effective hypothermia wrap is paying attention to detail, making sure that the victim's head and feet are well protected and insulated.

R = Refuel

If she is conscious, feed her. Shivering depletes the store of energy reserves. As "logs on the fire" are used to produce heat and maintain shivering, these "logs" need to be replaced. Since sugar is the fuel or "logs," the victim's blood sugar level needs to be maintained. Getting the victim to drink one cup of a sweet, warm liquid (try Jello with sugar, not Nutrasweet) every one-half to one hour is the best way to replace rapidly metabolized sugar. To produce this sweet drink, warm a cup of water or melted snow over a stove or candle and stir in one-half of a small packet of Jello, and have the victim sip it. If possible, encourage her to drink one cup every one-half hour.

M = Monitor

Monitor and maintain the airway. Keep a close watch on the victim.

The one thing that has not been mentioned as a modality of therapy is the technique of placing a non-hypothermic individual in a sleeping bag with the hypothermia victim. There are two problems with this technique. First, hypothermia victims do not absorb heat through the skin very well because of peripheral vasoconstriction. They rewarm from the inside out. And second, if the non-hypothermic rescuer overheats and begins to sweat, that moisture will defeat the dry climate inside the hypothermia wrap and render it less effective.

Because of the effects of hypothermia on the human brain, it is the leading cause of backcountry accidents and emergencies. We must remind ourselves that we are not designed for the cold environment. We are able to survive and thrive in it because of our intelligence. If we allow ourselves and our brain to become cold, that intelligence is lost. We begin to wander unconcerned and unaware of the ever-increasing danger to ourselves and our companions.

To be safe and to enjoy the rich experiences of the backcountry, we have to stay warm. Understanding hypothermia and the natural physical/physiological limitations of the human body is an essential part of the knowledge than an expert backcountry user has.

BE WARM, BE SAFE, and have many great adventures.

Long-Term Tips

Hyperventilate The Head-injured!

Blood flow to your patient's organs is influenced by two primary factors: 1) changes in bodywide vascular resistance outside the patient's organs, and 2) local regulation within the organs themselves.

The brain of a head-injured patient is swelling inside a very limited space. Local regulation of blood flow to the brain is determined, primarily, by changes in the carbon dioxide levels and, secondarily, by oxygen levels in the blood. Increases in CO2 in the blood causes some CO2 to cross brain cell walls. Inside the cell, CO2 increases the hydrogen ion concentration which results in dilation of the vessel feeding the cell. At the same time, a decrease in O2 produces a direct effect on the smooth muscle of the vessel wall also causing vasodilation. Blood flow to the brain increases and swelling increases.

Hyperventilation results in a decrease in CO2 and, thus, vasoconstriction. This reduction in blood vessel size may decrease the swelling of the brain and prolong your patient's life-expectancy all the way to the hospital.

If the hyperventilations are administered with supplemental oxygen, the brain is ensured enough O2 to maintain its life. But no supplemental oxygen is required to have the beneficial effect of decreasing the size of the swelling brain, especially in cases of epidural and subdural bleeds. With simple mouth-to-mouth breathing, the rate of ventilations can be increased to the point of having the desired benefit. And don't worry about over-hyperventilating your patient...it can't be done.

(From an interview with Eric Weiss, MD, Emergency Room Physician, Tahoe Forest Hospital, Truckee, CA, and Editor, **Wilderness Medical Letter**.)

Avert The Vomiter!

One thing you learn fast in the world of emergency medicine is when to suspect your patient is going to vomit. It happens far too often. That's when you roll him carefully and speedily toward your rescue partner. This procedure can sometimes prevent you from barfing, too. On the long carry (or the short haul), emesis (vomit) can be aspirated, ending the life of many patients.

The stomach is a bag that lies on the left side of your patient's body, just below the diaphragm. It fills from the patient's top right, and empties naturally from the bottom. When they are on their sides, the chance of aspirating vomitus is greatly reduced. The airway is protected. But if they are placed on their right sides, the opening that allows the stomach to be filled is down, encouraging a full stomach to empty the wrong way - towards their airway...and you.

This advice comes from Thom Dick in the January 1991 issue of JEMS: "Place the patient - even in C-spine precautions - on his left side. That keeps the downstream end of the esophagus at the top end of the stomach...the patient might burp but will be less likely to vomit."

Save The Amputated Part!

A hand, once separated from its body, can live up to six hours at room temperature. If kept cool, it may be microsurgically replanted 12 hours later with complete success. Amputated fingers, due to minimal muscle involvement, have been successfully replanted 30 hours later. What you do in the field makes the difference.

Microsurgery Center at the Hospital of the Good Samaritan in Los Angeles recommends these pre-hospital management guidelines: 1) wrap the part in sterile gauze, dry or moistened slightly (preferably with lactated Ringer's), 2) put it in a dry plastic bag, 3) put the bag in an insulated cooler filled with ice (NEVER DRY ICE) - without the cooler, put the bag in ice water or the coldest water available, and 4) keep the affected extremity elevated during transport.

They further recommend: 1) ensure the ABC's and do a complete patient exam to rule out or find and treat other injuries, 2) clean and bandage the stump, and 3) start an IV with lactated Ringer's at a "keep open" rate, if possible.

It is further suggested that these patients need a large dose of emotional support to prevent the downward spiral of shock. It may help to keep the damaged limb covered. Keep talking to the patient. Maintain close physical proximity to the patient. Do not overlook the healing power of personal contact.

(Schaff, Elizabeth: **Emergency**, January 1991. "Trauma Primer: Of Life and Limb.")

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SOLO offers a variety of courses in rescue, including High Angle, Advanced High Angle, and Water Rescue. **Backcountry Medicine**, a 2-day course at the basic level, has been a favorite of college outing clubs and other organizations since 1975. Now offered with certification in Wilderness First Aid. SOLO offers nationally registered **ALS courses through the paramedic level** as well as special short workshops on specific emergency medicine topics.

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If you would like to become a certified Wilderness First Responder and spend ten days in beautiful Wind River country, NOLS invites you to one of two WFR's. The WFR's, taught by Buck Tilton and Melissa Gray of the Wilderness Medicine Institute, are scheduled for September 9 - 19, 1991 and February 10 - 21, 1992. The cost is $600. For more information call the Admissions Office at NOLS, (307) 332-6973.

Wilderness Medicine Institute

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Telephone: (303) 641-3572

Wilderness Emergency Medical Technician Course At Western State College - Gunnison, Colorado July 1-26, 1991

This course is designed for outdoor leaders, backcountry rangers, rural ambulance attendants, and other individuals who provide emergency care in remote settings. While fulfilling the DOT minimum requirements for certification, this 160-hour program expands the topics to address the issues involved in extended care and introduces backcountry rescue techniques.

Certifications: SOLO's Wilderness EMT, National Registry EMT-B, and American Heart Association's CPR.

Instructors: Buck Tilton and Melissa Gray of the Wilderness Medicine Institute, Inc. and SOLO Wilderness Medicine.

Tuition: The cost of instruction, textbooks, handouts, and exam fees is $550. A discount will be given to WEA members, Western State College students and Gunnison County residents.

Credit: Eight hours of undergraduate credit is available for an additional $187.

Lodging and Meals: Located in the heart of the Rockies, Western State College provides an ideal setting for the course. Double occupancy dorm rooms are available for $362 and three meals a day for $306. Prices are for the entire 26 days. There is a May 15 deadline for meals and lodging at the college. There are also abundant motels and camping spots in the vicinity.

Registration: Enrollment is limited. To reserve a space send your name, address, and phone number, course name and dates, along with a non-refundable $300 deposit to **Wilderness Medicine Institute.**

Dispatches

CPR-Plus

A significant change in CPR may be just over the horizon and starting to rise. Standard CPR plus interposed abdominal counterpulsation (IAC) can improve survivability, say researchers Jeffrey Sack, MD, and David Bergman, MD. Choosing 135 New Jersey cardiac arrest victims at random, 10.5 percent receiving IAC recovered intact compared with 4.2 percent who received only standard CPR. In CPR-Plus, the upper abdomen is compressed after each chest compression to improve coronary blood flow. This technique, says Dr. Sack, "could easily be performed by a single rescuer." At this time, the clinical evidence **should not lead to an immediate change in the administration of CPR.**

Exercise-Associated Amenorrhea

Women need a certain amount of calories, protein and body fat in order to maintain menstruation. During periods of physiological stress, such as those that may be encountered on extended wilderness trips, ovulation and menstruation may stop (amenorrhea) as the body protects itself naturally against a pregnancy it might not be able to support. Exercise-associated amenorrhea is not a sign of peak physical condition, but instead indicative of a system working its way toward collapse. Drs. Barbara Drinkwater and Chris Cann found a significantly lower bone mass in women athletes with amenorrhea. There are serious implications of this reduced bone mass, including an increased chance of stress fracture during exercise and an increased chance of developing osteoporosis later in life.

Since it appears that amenorrhea is abnormal and unhealthy, it is suggested that women experiencing the problem decrease their level of activity by 5 to 15 percent, increase their caloric intake by 5 to 25 percent, and increase their calcium intake. If normal menses do not resume in six months, a visit to a physician is strongly recommended.

Hypothermia Update

In a presentation at the Society of University Surgeons in February, 1991, Peter Safar, MD, and Samuel Tisherman, MD, showed that dogs suffering hemorrhagic shock could be induced with profound hypothermia (less than 10 degrees C) and recovered even after two hours with no circulating blood. The obvious immediate application is a renewed faith in the now-historic adage of wilderness medicine **no one is dead unless warm and dead** (including dogs).

Recombinant Erythropoietin

When you're pushing up that mountain, or peddling one more mile, or stretching for that campsite (in other words, exercising), your blood gets thicker - partly because you're sweating out fluid from your circulatory system, partly because blood plasma is drawn from your vessels into surrounding tissue. Your percentage of red blood cells to other circulating cells (your **hematocrit**) rises. A normal range for your hematocrit is 37 to 49. During periods of intense exercise, it may go up another 10 percent. When you rest and rehydrate, the percentage of red blood cells returns to normal.

100,000 people in these United States have poor kidneys which produce an insufficiency of erythropoietin, the hormone responsible for the production of red blood cells. They live with hematocrits of 25 or less, and are labeled "anemic." With less oxygen-carrying RBC's, the anemic are generally weak, short of breath, and unable to enjoy the wild places that require exercise to get to.

Enter EPO (recombinant erythropoietin), a drug that stimulates RBC production and returns the anemic to an active lifestyle. Seventy thousand currently receive regular EPO injections.

Unfortunately, some athletes have begun to acquire and abuse the drug. Why? Almost immediately after an injection, red blood cell production increases and more oxygen gets to muscle cells and maximal aerobic power is enhanced (by as much as 8 percent in controlled tests). But every coin has two sides! Since blood has grown thicker during exercise anyway, EPO may raise the hematocrit to as much as 70 percent - more like syrup than blood. And it doesn't return to normal with rest and rehydration. Blood may stay thick for 5 to 10 days, and the hematocrit may stay high for months.

The problem? Thick blood is sticky, lumping into clots that cause strokes and heart attacks. At this writing, at least 18 young, competitive athletes have died from abuse of EPO.

If you suffer chronically from fatigue, shortness of breath and muscle weakness, see a doctor. You may find EPO a life-giver. If you want to improve your physical performance, see an exercise physiologist. YOU MAY FIND EPO A LIFE-TAKER.

Precordial Thump Revisited

Used to be a time, and some will remember, when we were taught to begin CPR by making a fist and thumping the patient over their still heart. Sometimes it worked, converting a lethal rhythm to a normal rhythm, and sometimes, used improperly, the thump caused a lethal rhythm. And sometimes, with over-aggressive administration, it unnecessarily traumatized the patient. It was dropped from CPR courses. But the precordial thump remains in the American Heart Association's Textbook of Advanced Cardiac Life Support. Why do you never hear of it anymore?

Recently, lightning induced cardiac arrest in a 14-year-old male in a remote mountainous area. CPR was initiated and continued for 45 minutes - without appreciable success. In desperation, the rescuers tried a thump. A pulse was immediately detected. Three days later, the patient was released from the hospital. There are no other documented cases of a precordial thump working after prolonged CPR. Heimbach and Newman, Emergency, May 1991, suggest that "when a monitor/defibrillator is not available at the present or near future, and when the patient has no pulse and a normal body temperature, a precordial thump may be considered."

Thumps should not interrupt CPR for more than 5 seconds. Pulse and breathing checks should be performed before and after the thump. It is delivered with the meaty part of the fist, as opposed to bony parts, to the middle of the sternum. "Care must be exercised," write Heimbach and Newman, "to ensure the fist is not more than 12 inches away from the chest."

Lightning Update

And speaking of death by lightning, according to the Berkeley Wellness Letter, May 1991, the number in the United States is on a downward swing - from 400 in 1943 to 75 in 1982 to 57 in 1989. The reasons cited are 1) a higher level of awareness of lightning danger and the proper precautions to take to avoid being hit, and 2) better medical treatment for those who are struck.

Lyme Disease Vaccine - Maybe

Yale researchers have produced a genetically engineered vaccine that prevents mice from contracting Lyme disease. The mice were vaccinated, then injected with the disease bacterium. Most experts agree that the final proof will come from tests in which the mice are exposed to the Lyme disease bacterium through the normal vector - ticks. Tick saliva seems to increase the infective ability of the bacterium. If that works, then they'll try it on humans. Estimated time of arrival for the human vaccine is five to eight years. Any volunteers?

Bear Repellent - Again

Controversy continues to surround the use of aerosol bear repellents. Add to the pro side at least one incident in which a charging griz sow was repelled by a double shot in the face from two simultaneously sprayed cans of Counter Assault, the most popular brand. Add to the con side worry on the part of the National Park Service that the aerosol, a derivative of cayenne pepper, will give hikers in bear country a false sense of security, causing them to take unnecessary and dangerous risks. Regardless of whether you are pro or con, bear repellent is not an excuse to take less than optimal anti-bear attach precautions while journeying in their domain.

Wilderness Medicine

Bookshelf

Wilderness and Rural Life Support Guidelines Treatment Guidelines for Outdoor Disorders

Robert J. Koester, ed.

DBS Productions, P.O. Box 1893, University Station, Charlottesville, VA 22903, $4.95, pp. 60.

Most prudent people who venture into the wild outdoors have taken a first aid course or read a wilderness medicine book at some point. Between the course or book and illness or injury, there is sufficient time for much to be forgotten. **Wilderness and Rural Life Support Guidelines** Is a pocket-sized (4"x7") waterproof, flipchart-type reminder. It fits easily into a fanny pack, day pack, or backpack. If you accidentally dunk it into a cold mountain stream, it not only stays intact but you can still write on it while its wet. The text and illustrations provide the user with clear, concise, and simple-to-follow treatment guidelines for medical disorders and injuries common in the outdoors.

Covered are shock, cardiac problems, respiratory disorders, sprains, fractures, dislocations, head injuries, wounds, blisters, burns, childbirth, and other problems. Special emphasis is placed on outdoor disorders such as heat problems, hypothermia, frostbite, lightning, high altitude illness, and venomous bites and stings. Finally, an extensive illustrated appendix covers patient examinations, adult and pediatric vital signs, burn tables, wilderness CPR guidelines, oral solutions, helicopter rescue, medications, and medical report forms.

It is obvious the text was extensively reviewed by the editors. They are all medical professionals who teach general first aid and more advanced courses. Most of the editors are also members of a search and rescue team, and are aware of the limitations and burdens of attempting aid during a blizzard or under intense heat.

Unfortunately, the book assumes too often that a helicopter will be available to assist in the rescue. And there are holes in the guidelines, such as the dislocations section in which they recommend reduction of one a few dislocations and then suggest that a hospital must be more than 6 hours away. On page one, the editors write: "Providers must **not** provide any treatment for which they are not certified." That's fine unless, of course, your patient needs care you can provide, but your card has expired!

The book does an excellent job of addressing some unique problems caused by long transport times in the wilderness. And the editors have produced a set of inexpensive yet durable guidelines that go a long way toward meeting the needs of emergency care providers in remote situations. ••

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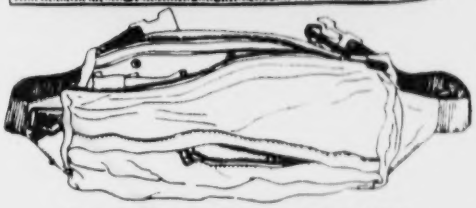

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Managing Editor: Kenneth L. Thompson, M.S., WEMT
Contributing Editor: Buck Tilton, M.S., WEMT-I/C
Features Editor: Frank Hubbell, D.O.
Production Editor: Carolyn J.C. Thompson, M.Ed.

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The *Wilderness Medicine Newsletter* is intended as an informational resource only. Neither the WMN nor its staff can be held liable for the practical application of any of the ideas found herein. The staff encourages all readers to acquire as much certified training as possible and to consult their physicians for medical advice on personal health matters.

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Wilderness Committee Meeting

The American Society for Testing and Materials (ASTM), a consensus-seeking group that establishes standards for various industries, held its semi-annual meeting in early May. The Task Group on Wilderness EMS, a s sub-group of the ASTM's F-30 EMS committee, met and agreed to write an ASTM guide for the performance of wilderness EMT's and First Responders.

The task group was reactivated last fall after individuals who are involved in wilderness education and outdoor activities and the ASTM search and rescue committee (F-32) sought to develop a consensus on wilderness EMS training issues.

To date the task group has agreed to write an ASTM guide for the performance of EMT's and First Responders who practice in the pre-hospital wilderness or prolonged transport environment. A standard guide of practice describes those skills and the knowledge expected of a practitioner in the environment.The group has also agreed to utilize the existing nationally recognized EMS-First Responder and EMT curricula as the basis for developing a continuing education approach to wilderness EMS education. The concept is similar to the PHTLS or ACLS course model.

Look for drafts of documents to be published in the Wilderness Medicine Newsletter. Individuals wishing to participate in the development process or who wish further information are asked to contact: John J. Clair, 35 Wagon Wheel Trail, Saratoga Springs, NY 12866 (H)-518-584-8234, (W)-518-474-2219. **

A Reader Asks . . .

"On a snowshoe trip I was leading near North Conway, NH, one of the clients turned cyanotic. At first I thought he was cold, but he began to complain of chest pain. After about 10 minutes, he seemed to recover, and walked out under his own power. He told me he had stable angina. Is there a difference between angina and stable angina? I've never heard that term before."

We Answer . . .

Lipid deposition on the inside of artery walls (atherosclerosis) and hardening of the arteries (arteriosclerosis), when they affect the coronary arteries, cause less blood to reach that part of the heart supplied by the occluded vessels. Often the first symptom the patient notes is chest pain (angina pectoris) with activity or stress. The pain is usually mild to moderate, and goes away in 3 to 5 minutes with rest and/or nitroglycerin. This is sometimes referred to as **stable angina**. If the vessel is completely occluded, the result is a heart attack (myocardial infarction). A piece of the heart muscle has died. Pain is severe, long-lasting, and most often unrelieved by rest or nitroglycerin.

In between lies **unstable angina**. It is sometimes called "preinfarction angina." The pain can occur at any time, even when the patient is at rest. The pain is correspondingly more severe than stable angina, takes longer to go away, but usually self-limits with rest and/or nitroglycerin. This patient is a high risk for sudden death, should be under a physician's care, and should not be snowshoeing. **

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Wilderness Medicine Newsletter

FOR THE RECOGNITION, TREATMENT, AND PREVENTION OF WILDERNESS EMERGENCIES

July/August, 1991 Volume 2, Number 4

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Sweat, Dehydration, Fatigue, And The Need To Drink

By Buck Tilton

We make heat constantly. We need the heat to survive, but we make enough to literally kill ourselves several times each day, especially when we are exercising. Mechanisms exist that allow us to shed the excess heat. Some of the heat is dissipated from our skin via radiation, convection and conduction, but the evaporation of sweat from our skin is our most effective cooling mechanism.

It is not uncommon to lose one liter of sweat during one hour of exertion, and possible to sweat out four liters an hour if we are fit but improperly clothed for the heat and humidity of summer. The loss of four liters of sweat can cause a serious, possibly life-threatening breakdown in our ability to cool ourselves unless the fluid is promptly replaced. And blood, which is mostly water, must carry more oxygen to our exercising cells. Making sure we are properly hydrated also ensures our blood volume stays within acceptable limits for optimum endurance.

Located on the underside of our brains is a pea-sized lump called the hypothalamus. Among other important jobs, the hypothalamus reads changes in body fluid concentrations and stimulates the sensation of thirst when we get dehydrated. Unfortunately, dehydration is rela-

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... the Need to Drink

(continued from page 1)

tively well-developed before the hypothalamus kicks in, so we sweat out water faster than we take it back in, and we need to establish a water-drinking regimen in order to give ourselves optimum performance and fun while we're active in the heat. It is best to drink a cup of water, say around 8 ounces, prior to starting out and then stop for a drink about that same size every 15 or 20 minutes. If cold water is available, it gets to work inside us quicker.

"It is not uncommon to lose one liter of sweat during one hour of exertion, and possible to sweat out four liters an hour if we are fit but improperly clothed for the heat and humidity of summer."

Water is hypotonic (less concentrated than body fluid) and, although some of it is initially absorbed from the stomach, most of it waits awhile for absorption. Cold water is passed rapidly into the small intestine where absorption speeds up. It sounds like a bother, all this disciplined drinking and it is, but I've tried it and can report there is a noticeable improvement in energy and sense of well-being. The old adage is still true: clear to pale yellow urine usually indicates we are properly hydrated.

Sweat is not just water. It contains dissolved salts called "electrolytes" (sodium potassium, magnesium, calcium), a bit of ascorbic acid, a dash of glucose, and traces of amino acids. That's why sweat has a taste and why dogs like to lick us when we're sweaty. When we are active, the electrolytes are of special importance. A muscle at rest has a greater concentration of potassium ions within its cells than in the extracellular fluid around the cells. The reverse is true for sodium, the greater concentration existing outside the cells. When the muscle contracts during work, potassium is pumped out of the cell and sodium migrates in. For the cell to relax, sodium must be pumped out and potassium sucked back in. Movement of magnesium and calcium are involved, also, but on a lesser scale.

While activity continues, body fluids move past the muscle cells carrying some of the extra-curricular electrolytes off to sweat glands, where they leave the body. Most experts agree we do not usually sweat out enough salts to significantly lower the concentrations in our blood, and a healthy diet keeps our electrolyte levels high enough for most activity. There is no harm, however, and possible good from consuming a drink enriched with a few electrolytes. Many "activity drinks" are on the market claiming to be solutions properly concentrated in electrolytes for replacement of those lost in exercise.

Of greater importance to us is the carbohydrate load in activity drinks. Carbohydrates are essential for prolonged muscle work, and their depletion will be felt long before any electrolyte loss will be. For quick energy and rapid rehydration, the concentration of carbo needs to be low enough for our bodies to treat the drink like water instead of food. It was long thought a concentration of as little as 2 percent was food, but it's generally accepted now that our bodies treat the 5 to 10 percent range as drink, passing it quickly from the stomach into the small intestine where absorption begins. High concentrations may actually linger in the stomach long enough to draw fluid from our systems to encourage digestion. Most of today's commercial products fall within the acceptable range.

But not all carbohydrates are created equal. Some get to work faster than others. Commercially-prepared activity drinks contain glucose, glucose polymers, sucrose, fructose and/or maltodextrin. Glucose, sucrose

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"For quick energy and rapid rehydration, the concentration of carbohydrates needs to be low enough for our bodies to treat the drink like water instead of food."

and fructose are simple sugars. Glucose polymers and maltodextrin are chains of glucose molecules. Some glucose can be absorbed directly from the stomach, since it is already what the body uses for energy. All the rest must be emptied into the small intestine to be absorbed, and recent research has shown that the rate of emptying is approximately the same for all of these carbos. The chains of molecules supply a little more carbohydrate, but are absorbed a little slower. Fructose occurs naturally in fruits and, because of its sweeter taste, it is often used in drinks. Some studies indicate fructose is a tad slower to be absorbed and more likely to cause a cramped or bloated feeling when consumed in quantity.

The only "energy drinks" sweetened solely with glucose, to my knowledge, are Gookinaid ERG(R) (Electrolyte Replacement with Glucose) and Gatorade Light(R). But all the "light" drinks are low in carbos, since they're made for people trying to lose weight. ERG is also nearly isotonic (the same concentration as body fluid), so it is rapidly absorbed. For comparison: the carbohydrate source in Gatorade(R) has sucrose and glucose in a hypertonic solution, Exceed(R) has glucose polymer and fructose in a slightly hypotonic solution.

Some commercial drinks are high-concentration carbohydrated for fast rebuilding of depleted energy stores. These range from a 13 percent concentration in drinks such as Carboloader(R) to as high as 23 percent in Ultra Energy(R) and Ultra Fuel(R). Concentrated carbo drinks are fast food for the body, but they're still food and not recommended for rehydration and quick energy. They would work well during breaks on extended trips requiring hard work. Soft drinks such as Pepsi(R) and Coca-Cola(R) are food-concentrations of fructose and sucrose.

In **Food, Nutrition, and Diet Therapy** (W.B. Saunder Co., 1984) the authors, Krause and Mahan, offer this recipe for a carbo/electrolyte home-brew: Add to 2 quarts cold water 6 ounces of orange juice concentration, 6 ounces of lemonade or limeade concentrate, 3 tablespoons lemon or lime juice, 2 tablespoons sugar or honey, and a pinch of salt.

Beer, as you know, is a diuretic, stimulating fluid loss. Beer is high in carbos, but they are large molecules which are absorbed slowly. The alcohol is absorbed quickly, interfering with the transport and utilization of oxygen.

The debate still rages over the use of caffeine. Most nutritionists says coffee and tea will dehydrate us. Physiologists generally say caffeinated drinks do not subtract more fluid than they add to the body.

In the end, as always, the effectiveness of an activity/energy drink must be determined by the user. Understanding how our bodies work, and what they need, should be of assistance in helping us decide. **

Wilderness Hydration Hints

- Save one-half-liter of disinfected water in your water bottle so you can drink it first thing in the morning to replace what you lost during sleep to respiration and digestion.
- Drink about one-fourth-liter of water every 20 minutes during the day. Carry water in the most easily reachable manner possible to encourage yourself to drink. Small bottles can be carried handily in belt pouches.
- Increase your rate of water consumption at high altitude since you're breathing faster and so losing water faster.
- Drink water with meals or snacks to ensure adequate digestion.
- If you've brought along an alcoholic drink, save it for the evening and follow it with a drink of water to prevent dehydration. The same might be true of coffee or tea.
- Water is just as critical in winter, perhaps more so, but your thirst mechanism may be more slow to remind you.
- You cannot train your body to need less water. In fact, the harder you train, the more water you need.

First Aid for Dogs

By Ken Thompson

Dogs. In addition to the mushers, hunters, and SAR teams who use them for work, ever growing numbers of recreational backcountry users are taking Fido along for companionship. Here are a few tips to make the most of four-legged forays.

Pre-trip Considerations

Be certain you understand state and local regulations. In areas where dogs are allowed, most rules require that they be either on a lead or under the vocal control of their handlers. Uncontrolled dogs seriously endanger wildlife and themselves.

Routine immunizations against distemper, adenovirus, leptospirosis, and rabies should be current, and dogs should be free of internal parasites and fleas. Consider carrying a pyrethrin-containing flea powder on an extended walk.

Dogs should be accustomed to a high quality dry dog food and may require half again as much food as they normally eat. They may carry their own food. However, even well-conditioned animals should not be burdened with more than one-third of their own body weight. Consider limiting young, old, or inexperienced dogs to half that load.

Dogs that are kept primarily as house pets are not up to the rigors of the trail. They should follow a conditioning program similar to your's before going on a multi-day trip. Out of shape animals are just as susceptible as humans to fatigue, muscle soreness, heat injuries, and dehydration. Inspect footpads regularly for damage and carry a soft sheet of leather from which you can fashion boots, if necessary.

Encounters with Plants

Skin contact with poison oak or poison ivy does not affect dogs. However, dogs frequently transmit the toxic oils to susceptible humans who come into contact with contaminated hair.

Stinging nettles, those nasty plants we often find unexpectedly along streams and lakes, are covered with sharp hairs. These specialized hairs are hollow and inject acetylcholine into the unfortunate critter who happens into them. Short-haired dogs who run through patches of the plant may be poisoned by the cumulative effects of thousands of tiny injections of acetylcholine. Signs include weakness, dyspnea, and muscle tremors. You may also notice salivation, diarrhea, rapid heart rate, and dilated pupils. Rapid evacuation to a veterinarian for a dose of atropine sulfate is in order.

Retching, pain, trembling, and sometimes, convulsions may indicate that your dog has ingested a poisonous plant. Induce vomiting by placing a teaspoon of salt on the back of his tongue; or administer a strong salt solution (4-6 teaspoons to eight ounces of water). To administer the salt solution hold the dog's head up. Put your fingers in the side of his mouth at the corner and pull out the lower lip to form a pocket. Then pour or spoon the liquid into this pocket, keeping the dog's head up. The liquid will run between his teeth and back so that he swallows it.

After he has emptied his stomach, give him milk or water to dilute the residual poison, and rush him to the veterinarian. Take some of the vomitus with you to your vet; exact knowledge of the toxic agent and the amount ingested will be most helpful in assessing the severity of the intoxication.

(If you know the dog has swallowed an acid, alkali, or gasoline or kerosene, do not induce vomiting. Instead, give milk to dilute the poison, and get him to the veterinarian immediately.)

Encounters with Animals

Being highly sensitive, inquisitive, and protective of you, your dog runs the risk of encountering other critters. While the greatest danger is exposure to rabies from foxes, skunks, raccoons and wolves, a properly vac-

cinated animal should be safe. There are some animals, however, that present special problems.

The porcupine is one enemy. Dogs must come into physical contact with a porcupine to be quilled. The muzzle and face are the usual targets, but a dog can be blinded by perforation of the eyeball. Porcupine quills, with their retrograde barbs, tend to work their way in deeper with every movement of the quilled animal.

The quills should be worked out gradually, not yanked out. Pliers make the job easier, but be careful not to break the quills off inside the skin. If the quills are left in, painful migration and infection will occur. Before you start to remove the quills, cut off the tips at an angle. This releases the pressure (porcupine quills are hollow) and makes them easier to remove. Slowly twist out each quill, starting with those in the chest area, as they may work through the skin into the vital organs. Then pull out those around the face. Put any standard antiseptic into the wounds. But as soon as you can, get the dog to a vet, who may put the dog under an anesthetic to complete what would otherwise be a long and painful process.

Dogs are always getting sprayed by skunks. First, wash the dog's eyes well with plain warm water and apply drops of warm olive oil to the eyes. This relieves the stinging caused by the spray. The time-honored method of removing skunk odor from a dog's coat is washing him in tomato juice, followed by a soap and water bath. It may not counteract the odor entirely, but it will help. Diluted lemon juice also cuts the odor.

Dogs, because of their smaller size are at greater risk from venomous snakebite than are humans. The eastern diamondback rattlesnake is capable of killing a dog unless prompt therapy with antivenin and supportive treatment is carried out. Such therapy will require an evacuation, keeping the animal as still as possible.

Traumatic Injuries

Dogs that have suffered severe trauma, having fallen from a height or having been struck by an automobile, should be treated as humans (i.e. conduct a primary survey). Be sure that the air passages (nose, mouth and pharynx) are free of saliva, discharges, or any other substance and the head and neck are extended so the dog can breathe.

Shock may follow any injury or severe fright. The dog may be prostrate or in a condition of nervous excitement. The symptoms of shock are weak pulse and shallow, rapid breathing. (Normal heart rate may be between 65 - 90 beats per minute for a mid-sized dog; normal respiration rate between 15 - 30 per minute.) The eyes will have a "glassy" look due to dilation of the pupils, and usually the gums are pale. These signs indicate impending failure of the circulatory system. Keep the dog as quiet as possible. Avoid noise or talk that might prompt him to try to move. In cool weather, cover him to maintain body temperature. A dog in shock should be taken to a veterinarian as soon as possible since the administration of intravenous fluids and drugs may mean the difference between life and death.

Gross bleeding must be stopped immediately using direct pressure. When the bleeding has been controlled, cut away hair surrounding the injury, wash the area with clean water and cover it with gauze and secure with a bandage. Be careful not to cinch a bandage too tight. A dog's circulation is cut-off very easily and the signs are difficult to recognize. Take the dog to a veterinarian promptly for examination and further treatment.

Wash superficial skin injuries with antiseptic soap and water and then apply a topical antibiotic. Clip hair away from the injury before treating. If the wound is jagged or gaping put gauze over it and secure it in place with adhesive tape.

Even if there is no apparent injury after an accident a dog may be hurt internally. If he is weak or prostrate and his gums are pale grey in color, you can be fairly sure that he is hemorrhaging internally. Treat for shock and evacuate. If there is bleeding from the nose but no apparent damage to the nostrils, it may mean a head injury. If there is bleeding from the mouth, inspect the tongue and inside of the mouth for cuts. Even when there is no immediate sign of internal bleeding, a prompt veterinary examination is important.

Fractures are usually self-evident: intense pain and inability to stand or use the leg or legs are indications of fractures. If a leg is broken, keep it in position as well as you can. If a broken bone is present in the lower part of a limb, allow the foot and lower limb to dangle and apply a soft, well-padded splint without causing further injury to the soft tissues at the site of the fracture. If the pelvic area, shoulder blade or rib cage is affected, do not try to splint. Keep the dog as immobile as possible and secure him to a rigid litter for the trip out.

Sprains and other injuries to muscles and ligaments often are hard to distinguish from broken bones. The affected area is swollen and tender. Emergency treatment consists of keeping the dog quiet, applying a splint and cold and evacuating him with as little movement as possible. For pain resulting from a musculoskeletal injury you may administer aspirin (the dosage for a mid-sized dog would be half an aspirin no more than twice a day). Do not under any circumstances administer acetaminophen; it is highly toxic to canines.

Dislocations are most frequent in the hip. There is loss of movement and swelling. The affected bone may be held unnaturally. Apply cold compresses. Veterinarians I consulted recommended <u>not</u> attempting to reduce the dislocation. You will likely do more harm than good. However, keep in mind that the sooner the joint is reset, the less severe the after-effects will be. Prompt evacuation is the key.

Treat burns as you would treat a burned human. First put the fire out by soaking liberally with cool water. Then assess for damages. Any burn that goes through the full thickness of the skin is highly susceptible to infection and should be evacuated.

...Dogs

(continued from page 5)

Heatstroke

This not only happens when a dog is exposed to the sun overlong or exercised hard in hot, humid weather, but very often when a dog is left in a car or small building with no air circulation during hot, humid, sunny days. Dogs do not sweat. They keep their brains cool by panting, a mechanism that passes cool air past the arteries of the head. A classic sign of heat injury is flaming red tongue and gums. Symptoms are lying prone and breathing with difficulty. To save his life, reduce his body temperature immediately by dousing him with water and fanning him to evaporate as much heat as possible. Concentrate your efforts on the head and neck. (Normal temperature for a dog is between 101 and 102 degrees F.)

Drowning

All dogs can swim, but some aren't proficient and even the strongest swimmer can drown if he becomes exhausted. A dog may fall or get into a steep-sided pond or a swimming pool where he can find no foothold to pull himself out. To revive, first hold the dog up by his hind legs at the hocks to get excess water out of his lungs. Then, give artificial respiration. Lay him on his side, extend his head and neck and pull the tongue forward. Then close the mouth and give mouth to nose respirations. Keep it up with regularity. As long as there is a heart beat there is hope. Because of their body structure dogs do not respond to full blown CPR. Any nearly drowned dog should be taken to the vet ASAP.

Seizures

A dog may run or stand quietly immediately prior to a seizure. When he falls, gently restrain and protect him with a blanket or coat. Do not muzzle him or put anything in his mouth. Keep him quiet; in fact leave him alone for a few minutes. When he has temporarily recovered, take him to the veterinarian.

Foreign Objects

Sometimes a dog swallows a stick, a stone or a sliver of bone which lodges in his throat. He will cough and choke, paw at his mouth and shake his head. Open his mouth and look inside...at his tongue, on top and underneath; at his gums and teeth, especially at the roof of his mouth (the hard palate) across which a short piece of bone or stick can be lodged. Pull his tongue out, holding it with a handkerchief for a better grip, and look down his throat. If you see the object and it isn't too deeply imbedded, pull it out with your fingers or tweezers. If it is embedded deeply, the veterinarian will have to get it out. Persistent vomiting is the cardinal symptom of a foreign body lodged in the intestinal tract.

Eyes

For inflammation, cuts, and scratches, wash eyes with an eye lotion or boric acid solution; if neither are available use lukewarm water. Dry eyes gently with gauze or a soft cloth.

When the Worst Happens

If your beloved four-legged companion suffers severe trauma (perhaps mauling by a bear) and is obviously in great pain from mortal injuries, you may choose the humane decision to end his life quickly rather than allow him to suffer. Faced with this unfortunate choice, the best method is a gunshot to the head. If you are without a firearm, the next best method is a forceful blow to the back of the head near the base of the skull with a heavy, blunt instrument. As one vet put it, "For all parties concerned, strike with commitment. You want to do this horrible job right the first time."

Handling an Injured Dog

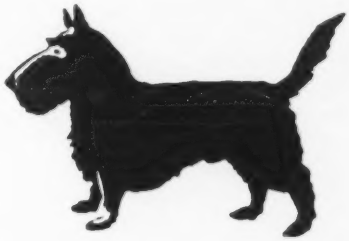
Attending to an injured or sick dog can be hazardous. An animal in severe pain or discomfort may flail and bite uncontrollably at anything nearby, including a familiar and well-intentioned human. If two humans are available to attend to a wound, the animal's regular handler should restrain the dog. You can kneel beside the dog and place one arm across the back, pinning the dog's shoulder to your torso with an elbow. That hand can grasp the dog at the base of the neck. Use the other hand to firmly tuck the dog's muzzle under your arm. Alternately, you can construct a temporary muzzle with a piece of cord. Form a loop with an overhand knot on one side. Keeping the knot on top, slide the loop over the dog's muzzle and gently tighten the loop. Then wrap the ends of the loop down and around the muzzle, crossing

them under the jaw. Pull the ends up behind the dogs ears and tie.

To carry a large dog by yourself, first apply a muzzle. Then stoop down with your back towards the dog and put him on your shoulders, holding his feet in front.

A rigid surface, such as a pack frame or a couple of large boards fastened together to make a stretcher is by far the best method of transporting an injured dog. Since most injuries are exascerbated by movement, you will want to fasten the dog as securely as possible to a litter without compromising breathing. In the event a rigid frame is not available, a dog without a spinal or pelvic injury can be carried on a fabric litter. Any strong cloth can serve very well as a stretcher, with knots tied in each corner and a strong branch or pole inserted in the knots on each side. As you would with a human, try not to shift the dog's position when sliding him on a stretcher.

Above all, be well-informed of the natural hazards in your locale and maintain control of your dog at all times. Happy trails. **



Leech!

by Suzanne Rizzi

Leech! Just the sound of the word makes me cringe. But if you're planning a trek through the midwestern or northeastern U.S., the tropics, Asia, Europe, or near any muddy pond or stagnant swamp, for that matter, you and a leech may cross paths.

A possible scenario: You're trekking through Nepal. It's the time of the monsoon. You're sweating, breathing hard; you stop to rest under the arms of a Simal tree. The leech, with its five pairs of eyes and long, flat black body, senses your heat and is now on your trail. It drops off the tree and lands right behind your left ear. Clenching onto your skin, it opens its three-jawed, black mouth and begins to gnaw, probing for blood - and, indeed, a leech can consume a lot of it. In one sitting, it will ingest enough blood to expand 10 times in body size.

Would you know if this leech were latched on to you? There's a good chance not. Many purport feeling a cold, localized sensation in soft, warm places leeches love, such as armpits, in between toes, or behind left ears, for example.

With two suction cups, one on its head and tail, the leech, indeed, has the capacity to latch on pretty hard. But tearing the creatures off may not be such a good idea - a ripped off leech is bound to take along with it the better portion of whatever it's clamping onto, namely your skin.

To avoid receiving a possibly bloody and highly infection-prone wound, doctors advise resisting the impulse to immediately tear the creatures away and, instead, suggest finding means to make the critters drop off voluntarily.

Reach into your pack and grab some matches, or light a cigarette, if you have one. A bit of fire on the back of your average leech should be enough coercion to make it undulate away. For more stubborn cases, try a generous application of salt, iodine, or insect repellent. (Editor's Note: Remember that great scene in "African Queen" when Humphrey Bogart hauls himself back aboard after dragging the vessel through the reeds. He's covered with leeches and says to Katherine Hepburn, "Don't pull them off, get me some salt. They'll poison the blood." Wilderness medicine at its finest!)

After the leech is removed, one way or another, examine the wound for any mouth parts that may be left behind and remove them. Then cleanse the wound thoroughly with antiseptic soap several times a day. These wounds are highly susceptible to infection. Some people will have mild localized allergic reactions. Anaphylaxis is a possibility.

Though commonly thought of as a gruesome annoyance, the leech hasn't always been considered purposeless. Doctors in the past not only used leeches "to bleed" away disease, but also to prevent and alleviate blood clots. This was done by transfusing the blood from a leech, which contains the anti-coagulation secretion hirudin, into the veins of human beings.

Though still used in some parts of the world for medical purposes, today you're not so likely to run into a leech unless you hike through humid terrain.

If you're traveling in leech territory, it's a good idea to check regularly for these sneaky little invertebrates. Though also known to feed off an occasional mollusk, such as a snail or clam, if given the choice, the leech will undoubtedly prefer nibbling on the neck of an ambulatory vertebrate like yourself over that of a clam. **

SOLO Wilderness and Emergency Medicine Seminars--1991

Course costs:

- Wilderness First Responder (10 days): $625
- Wilderness EMT (one month): $1125

Residential courses include lodging, meals, all instructional materials, textbooks, and examination and certification fees. Costs may vary for courses at sites other than SOLO.

Wilderness First Responder

- Sept 30 - Oct 11 (SOLO)
- Oct 28 - Nov 6 (AMC, NH)
- Dec 2 - 11 (SOLO)
- Dec 12 - 21 (Hulbert OC, VT)
- Jan 2 - 11 (Unity College, ME)
- Mar 2 - 13 (Nantahala, NC)

Wilderness Emergency Medical Technician

- Sept 30 - Oct 25 (SOLO)
- Oct 28 - Nov 22 (SOLO)
- Nov 25 - Dec 19 (Teton Science Center, WY)
- Jan 6 - 31 (SOLO)
- Jan 6 - 31 (Nantahala, NC)

WEMT Recertification $175

To ensure that "Wilderness" issues are sufficiently covered, an additional day is added to our traditional 3-day EMT Refresher. Completion of the 24-hour EMT refresher and the 8-hour WEMT segment plus exams will recert a SOLO WEMT and provide eight hours of continuing education credit.

- Nov 23 - 26 (SOLO)
- Dec 27 - 30 (SOLO)

Winter Medicine, Rescue, and Survival

Preparation, prevention, bivouac, and evacuation are key considerations. Plenty of hands on experience. Contact the AMC, (603) 466-2727 for registration information.

Other Course Offerings

SOLO offers a variety of courses in rescue, including High Angle, Advanced High Angle, and Water Rescue. **Backcountry Medicine**, a 2-day course at the basic level, has been a favorite of college outing clubs and other organizations since 1975.

For more information, write to:

SOLO, RFD 1, Box 163, Tasker Hill, Conway, New Hampshire, 03818. Or call: (603) 447-6711

Wilderness Medicine Institute

P.O. Box 9, Pitkin, Colorado, 81241
Telephone: (303) 641-3572

Wilderness First Responder
Mount Shasta City
November 4 - 15, 1991

$375, includes tuition and materials.
Write for details on lodging and meals.

Wilderness Emergency Medical Technician Course
Pitkin, Colorado
January 6 - 31, 1991

This course is designed for outdoor leaders, backcountry rangers, rural ambulance attendants, and other individuals who provide emergency care in remote settings. While fulfilling the DOT minimum requirements for certification, this 160-hour program expands the topics to address the issues involved in extended care and introduces backcountry rescue techniques.

Certifications: SOLO's Wilderness EMT, National Registry EMT-B, and American Heart Association's CPR.

Instructors: Buck Tilton and Melissa Gray of the Wilderness Medicine Institute, Inc. and SOLO Wilderness Medicine.

Tuition: The cost of instruction, textbooks, handouts, and exam fees is $600. A discount will be given to WEA members.

Lodging and Meals: Write for information.

Registration: Enrollment is limited. To reserve a space send your name, address, and phone number, course name and dates, along with a non-refundable $300 deposit to **Wilderness Medicine Institute.**

Dr. Le Fort and the Fractured Face

By Buck Tilton

At the bottom of a steep, wet, slippery mountainside, we found the woman. She was barely able to mumble out her fear and thanks that we had arrived, through the swollen mass that had been her face. Cerebrospinal fluid, usually clear, was tinged with the red of her blood as it leaked from her battered nose. Her eyes were swollen blackly shut. That face had been used to halt a 40-foot slide down sloping ground to the rocks below. Secured in our litter, we were able to get her to an acceptable landing zone, where a helicopter whirred her off to full recovery - after many restorative surgeries.

Beneath the wonder of a smile lies a bony structure that is susceptible to being broken just like all the other bones of the human body. The forehead is the lower end of the frontal bone of the cranium and it forms the top of the eye socket. The side of the head, above the ears, is the temporal bone of the cranium. Joining the temporal and frontal bones is a small plate of bone called the sphenoid, where we usually touch when we point out our temples. The cheekbone, forming most of the rest of the eye socket, is called the zygomatic bone. Holding the upper teeth and extending up to form the inner part of the eye socket is the maxilla. The small nasal bone lies directly posterior to the nose, between the eye sockets. mandible is the name applied to the lower jaw. The mandible is attached to the cranium at the temporal Bone at a place called the temporomandibular joint. Collectively, we call these bones the face.

In 1900, so one unproven story goes, Rene LeFort, the French pathologist, tossed already-dead bodies out of consecutively higher windows of the building that housed his laboratory, in order to research broken bones. A couple of things we know for sure about Dr. LeFort include 1) he would beat the faces of cadavers with a big chunk of wood to study how they cracked, and 2) the rating system he developed for maxillofacial injuries involving swelling, bleeding and instability of the underlying bones (LeFort fractures I, II & III) still bears his name.

LeFort I fractures are a transverse break that separate the roof of the mouth (the hard palate) from the rest of the face. The fracture line runs through the nose, leaving the hard palate to float free. Upper teeth will move around loosely as a unit when this patient's face is palpated. When lying on their backs, these patients may lose their nasopharyngeal (nose to throat) airway.

LeFort II fractures, the "pyramid face fracture," runs from the hard palate up to the orbits of the eyes above the nose. A sort of pyramid piece of bone, including the upper jaw and the nose, is separated from the rest of the face. Significant swelling and bleeding may often make it very difficult for this patient to breath.

LeFort III fractures run from the temporomandibular joint (TMJ) through the orbits of the eyes, effectively separating the face from the rest of the skull. This fracture often cracks the cribiform plate, the bone that separates the sinuses from the brain, letting cerebrospinal fluid (CSF) leak out.

In the wilderness setting, or any pre-hospital setting, it is doubtful you'll determine what type of facial fracture you're dealing with. But the risk of free-floating bone, blood and swelling causing an airway obstruction is high, and broken faces require careful attention. Initial treatment of facial fractures should include immediate and careful (guard the c-spine) placing of the patient on one side. This allows secretions to flow away from the airway and the sloppy facial bones to fall away from the airway instead of back over it - thank you, gravity. Generally, the left side is considered best, since a tiny bit less strain is put on the cardiovascular system. If, for some reason, a lateral position is considered inappropriate, the patient's upper teeth can be gently grasped and pulled forward to open the airway. If the patient is conscious during the teeth-pulling maneuver, you, the rescuer, could suffer damaged digits. For those of us carrying oropharyngeal airways (a curve of plastic placed in the mouth to hold the airway open) in our first aid kids, it would be appropriate to place one gently in an unconscious patient with a broken face. A nasopharyngeal airway, or anything placed in their nose, would be dangerous and unacceptable. The chance of making the injury worse is considerable. This patient should be considered an immediate evacuation.

Although Dr. LeFort did not leave his name stuck to injuries to the mandible, blows to the face still might result in a damaged jaw. Signs and symptoms would be similar to other facial fractures: pain, discoloration and swelling in the injured area. Other signs might involve loss of use of the lower jaw, difficulty with speech, bleeding around the teeth, and malocclusion (improper alignment of the upper and lower teeth).

Treatment of a seriously broken mandible is the same as for any facial fracture. Maintain an adequate airway with proper positioning of the patient and arrange for a rapid evacuation. **

Heat and the Need To Eat

By Buck Tilton

The heat we constantly produce is a result of food being burned on a cellular level producing the energy that drives us. Potential energy stored in food is measured in calories. Water, vitamins, minerals and fiber are necessary for life, but they have no energy potential. All our energy comes from three sources: carbohydrates, fats and proteins.

Our physical life depends on maintaining a certain amount of glucose (blood sugar) in our blood. If glucose is not being eaten, our bodies make it from other sources. When low blood sugar develops we experience it as hunger, fatigue, maybe depression. If our blood sugar level drops too low, our bodies begin to convert stored fat into glucose (which is, of course, how we lose weight). When high blood sugar develops, some glucose is stored inside of cells as glycogen. A continued excess of glucose is converted to fat and stored away for a low blood sugar day. To much sugar, therefore, is as bad as too little.

Carbohydrates are either simple sugars or chains of simple sugar molecules called starches. Simple sugars are absorbed directly into the bloodstream, but starches must first be broken down into simple sugars before they can be absorbed. So simple sugars give quick energy and complex sugars (starches) give longer lasting energy. Foods full of simple sugars include candy and fruit, soft drinks and honey. Foods rich in starches include bread, potatoes, grains and cereals, beans, nuts, seeds and vegetables.

Fats are long chains of carbon and hydrogen atoms, and highly concentrated sources of energy. By weight, fats contain more than twice the calories of carbos and proteins. A saturated fat is one that hardens at room temperature. This same hardening can take place inside our body, especially along the walls of our arteries. All unsaturated fat stays oily and is a little healthier to eat, but our bodies treat them both the same, from an energy standpoint. Fats take a long time to digest and, once digested, take more time and oxygen to be utilized as energy. We use them during periods of rest and light activity (like reading this newsletter). For furious outdoor activity, we burn carbohydrates much, much faster than fats. Saturated fats come mostly from animal and dairy products. Unsaturated fats are found in vegetable oils.

Proteins are chains of amino acids (nitrogen, carbon, oxygen and hydrogen). They are the building blocks of human tissue. Our bodies will make 16 of the 22 necessary amino acids from carbohydrates and fats. The other 8 must be eaten, and these are often referred to as the "essential amino acids." Twenty years ago, it was thought proteins were not usable for energy. Bodies prefer to use proteins to make muscle, bones, skin, etc. but it will use them for energy during long periods of exercise. They are incompletely burned, and a large amount of protein must be broken down for a small amount of energy. Fish, skinless chicken, low-fat milk, and bean/brain combinations are healthy sources of protein.

When we start up the trail, our bodies immediately burn the energy stored as glycogen. Those are quickly gone and muscles begin to draw on blood sugar. As the blood sugar level falls, we start to utilize our fat stores. Energy in our bodies stored as fat is virtually unlimited, but tapping this source is limited by the immediacy of our need (it takes time to use fats), the availability of oxygen in the muscles, and the increased build-up of waste products as fat is burned. The result is we slow down and our energy-need is matched by our energy-availability. As we become more fit, we become more efficient users of fat. A fit person will begin to use proteins for energy when the need for fuel exceeds the body's ability to mobilize fats. The unfit usually poop out too fast to burn proteins.

Before heading out, eat a meal high in carbohydrates and low in fats and proteins. Give it about an hour to get to work. Replenish your energy with several small meals during the day, instead of one big one. Snack on starchy foods: dry and fresh fruits, dry-roasted nuts, peanut butter on whole-wheat crackers, granola bars that are low in fat. Simple sugar-rich foods, like candy, are o.k. in moderation, but too much sugar can draw water from the body to dilute the food for digestion, helping to create dehydration and an uncomfortable, gassy feeling.

A company in California, Powerfood, Inc. represents the state-of-the-art in the production of a food for endurance. Their PowerBar(R) is composed of an oat bran base. In each bar are 40 grams of carbohydrate, 12 grams of quick-energy simple carbos and 28 grams of sustained-energy complex carbos. PowerBars contain 10 grams of protein. The 2 grams of fat per bar are natural to the grains and other ingredients and no fat or sweetener is added. Minerals and vitamins that relate to energy metabolism have been added.

If one bar is eaten 30 to 75 minutes before activity begins, with 8 to 16 ounces of water, enough energy for 1 to 1-1/2 hours of sustained exercise should be available. Chunks of the bar can be consumed as needed during periods of high physical stress to maintain energy. The oat bran in the bar mixes with the water to form a sort of "gel" that won't slosh around and irritate the stomach's lining during exercise, as a drink alone might do. PowerBar, and its recommended rate of consumption, represents the ideal food-as-fuel source for those who want to perform at their physical best.

PowerBars are distributed by: **Powerfood, Inc.**, 1442A Walnut Street, Berkeley, CA 94709. Phone: 800-444-5154. **

Third Annual Wilderness Education Conference Hosted by the National Outdoor Leadership School

To further the National Outdoor Leadership School's (NOLS) mission "to be the best source and teacher of wilderness skills and leadership which protect the user and the environment," the school will hold its third annual Wilderness Education Conference September 7th and 8th. The location of the conference is the University of Missouri Geology Field Camp in Sinks Canyon, Lander, Wyoming.

Leaders in the areas of wilderness use and ethics and leadership, education and outdoor skills will be presenting workshops and discussions on this year's theme, "Wilderness Education: Today to the Year 2001."

David R. Brower, founder of Earth Island Institute, will give the keynote address. Other speakers include Joe Serra, founding member of the Wilderness Medical Society, Paul Petzoldt, founder of NOLS and the Wilderness Education Association; Dan Garvey, Executive Director of the Association for Experiential Education; Kitty Calhoun Grissom, world class mountaineer; Gary Cargill, Regional Forester of the U.S. Forest Service; Carrie Hunt, USDA Forest Service Wildlife Biologist; and Jed Williamson, Safety Chairman of the American Alpine Club.

The conference and registration fee includes all presentations, three meals per day and evening entertainment for both Saturday and Sunday. Early registration ended August 1st.

For more information about the Wilderness Education Conference, contact NOLS, Box AA Lander WY 82520, (307) 332-6973.

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Managing Editor: Kenneth L. Thompson, M.S., WEMT

Contributing Editor: Buck Tilton, M.S., WEMT-I/C

Features Editor: Frank Hubbell, D.O.

Production Editor: Carolyn J.C. Thompson, M.Ed.

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The *Wilderness Medicine Newsletter* is intended as an informational resource only. Neither the WMN nor its staff can be held liable for the practical application of any of the ideas found herein. The staff encourages all readers to acquire as much certified training as possible and to consult their physicians for medical advice on personal health matters.

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DISPATCHES

Toxicon Speaks on the Mojave Rattler

The International Society of Toxinology produces an official journal, **TOXICON**, that reported, in 1989, the research of Glenn and Straight on the venom of the Mojave rattlesnake (Crotalus scutulatus scutulatus), a reptile long considered to be the most dangerous of all American rattlesnakes. In most pit vipers, the venom contains hemorrhagic enzymes, producing noticeable swelling and discoloration but seldom producing death. The researchers found that venom of the Mojave rattler in the California and northern Arizona areas of the desert contained an enzyme with potent neurotoxic effects but little hemorrhagic activity. The bite of this snake, therefore, will most likely produce nerve paralysis without a lot of swelling and color. This might lead the doctor to misdiagnose the problem and fail to administer enough antivenom. Dr. Findlay Russell and Willis Wingert, internationally recognized venom experts, recommend immediate administration of 10 vials of antivenom regardless of the local reaction when treating a known scutulatus bite.

- Glenn and Straight: "Intergradation of two different venom populations of the Mojave rattlesnake in Arizona," **Toxicon**, 1989: 27(4):411-8.

Assessment: The Pupillary Light Reflex

When assessing a patient's pupils for reactivity to light, keep the following in mind:

In the human brain that is functioning normally, both pupils will constrict when a light is shined into either eye. This is because each eye communicates with both sides of the brain. Messages from the side of the retina closest to the ear go to the side of the brain closest to that ear while messages from the side of the same retina closest to the nose go to the opposite side of the brain. So, when light hits one retina both sides of the brain receive an impulse, and both pupils receive the alarm message, and constrict.

Update: New EMT Curriculum

Samaritan Health Services, the company hired by the National Highway Traffic Safety Administration to rewrite the EMT basic curriculum, announced they will release no information before March 1992. This, they say, will avoid the spread of any misinformation. A goal of the revision is to research state EMS department records and hospital patient records to determine which current procedures are working and which aren't. It is also the intent of the rewriters to address the applicability of these procedures to rural settings.

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Wilderness Medicine Newsletter

FOR THE RECOGNITION, TREATMENT, AND PREVENTION OF WILDERNESS EMERGENCIES

September/October, 1991 Volume 2, Number 5

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Search and Rescue Basics: Type I - The Hasty Search

By Buck Tilton

While Mom and Dad set up camp, four-year-old Jimmy was left too much on his own. Around Quartz Campground the forest is open and park-like for long distances in every direction. One border, the north, is formed by the heavy mountain run-off of Quartz Creek, and the opposite border is a steep ridge. East and west along the high valley the forest must seem endless to the mind of a small child. The First Notice of the incident was Mom's phone call. It was almost dark by the time the frantic mother tried to explain to the 911 dispatcher in Gunnison that her son was missing. Every night grows dangerously cold for a four-year-old at 10,000 feet elevation in the Rocky Mountains.

The LAST Philosophy

- **Step One: LOCATE.** Each lost victim must be physically found. Nothing else can be done for the subject until a location is established.
- **Step Two: ACCESS.** Often the victim is found but direct contact has not been established. Access is generally considered a rescue operation, and may

(Continued on page 2)

... The Hasty Search

(continued from page 1)

involve simply walking in to where the subject was spotted from the air or setting up a complex rope system to reach the subject on a vertical face.

- **Step Three: STABILIZE.** Usually this refers to medical stabilization, each victim requiring (with a few exceptions) some treatment before transportation. Stabilization may also refer to the environment if, for instance, a downed plane, easy to locate and access, was hanging precariously on the edge of a cliff.
- **Step Four: TRANSPORT.** Getting the victim safely out can be straightforward and brief or difficult and time-consuming.

The team in Gunnison received their Call-out as the sun set and opted to begin the search immediately. Search is an emergency. The subject may be in danger from injuries and/or the environment. The passing of time, especially if the weather changes, destroys clues. When victims have more time to wander, they cover more ground--so getting to work soon eases the difficulty of the search. But, despite the urgency of searching, it is sometimes hard to justify an immediate mobilization since victims often show up on their own. Given the circumstances of a small child, missing on a cold night (which would reduce the chance of his wandering), a Hasty Team of four from Gunnison left for the one hour drive to the mountain campground. As individuals, they were each fit, fast, well-trained, and equipped for self-sufficiency.

A Hasty Search is a Type I Search, where speed is chosen instead of efficiency and thoroughness. *The team was able to offer an immediate show of concern and effort on behalf of the aggrieved parents.* Speed gives the team the best chance of finding a conscious, responsive victim. Search is a mystery that must be solved, and the searcher does best who goes in search of clues instead of a subject. There is only one victim but the clues are many. A Hasty Team has the opportunity to gather clues when they are freshest.

> *"A Hasty Search is a Type I Search, where speed is chosen instead of efficiency and thoroughness."*

The Search for Clues

Clues are information, objects, or any other evidence that will help solve the mystery. Clues may be seen, heard, smelled, touched, deduced or stumbled upon accidentally - and the process of clue-gathering goes on as long as the search continues. No source should be overlooked.

Clue-finding begins with questions:

- **To what general category does the subject belong (child, hunter, hiker, climber)?** The searcher wants a good guess at the strength of the victim, the type of terrain he might attempt to cross, the speed of his travel.
- **Where was the subject last seen or known to be?** This is the starting point for all physical clues.
- **What general circumstances surrounded the disappearance?** Was the subject headed somewhere? By what route? How prepared was he to be out? Was he anxious, afraid, or angry when he disappeared?
- **What is the subject's physical and mental health?** Was the subject intoxicated? On drugs? Medically sound? Taking medications? What do the meds do? Was the subject depressed? Senile?
- **What is the victim's general personality type?** How might he act when he realizes he is lost?
- **What gear and clothing is the subject carrying or wearing?** What colors? What type of footgear and what does the track look like? How long will he probably be able to survive?
- **What is the local terrain like?** Does the trail fork? Is the river crossable? Does anything look inviting from the last known point? It might help searchers determine the most probable line of travel...and chances for surviving.
- **What does the lost person look like?** What is his build? Hair color? Are there any distinguishing physical features?

From the last known point, the Hasty Team asked themselves an important question: What would I do if I were a lost four-year-old? (Where would I go? How would I act?) They knew from research that there are trends in the way lost people behave. For instance, lost people tend to follow the path of least resistance. Trails, roads, power lines, game paths, stream banks, etc. are far more likely to produce clues than deep woods, dense thickets, and steep hillsides. Inclement weather tends to drive the

lost to shelter, and darkness tends to put them to sleep, or at least slow their wanderings. (Note: an increasing amount of evidence shows that some lost people travel more at night.)

Choosing to move down the valley, keeping to the open forest, the searchers moved relatively quickly. They maintained a distance between themselves that allowed their bright flashlight beams to overlap in the moonless darkness. Knowing Jimmy's fear of loud noises, they kept their calls soft and reassuring. Knowing his fascination for water, one searcher walked near the creek.

> *"There are trends in the way lost people behave. For instance, lost people tend to follow the path of least resistance."*

One of the searchers found the tracks of sneakers, tracks with small round circles in it, the same size and shape as the ones the Hasty Team had found at the family's campsite. The tracks were in wet mud near the creek. They went to the water's edge, but turned and entered the forest again before disappearing in the darkness and heavy duff.

About one-and-a-half hours below Quartz Campground, one of the searchers found a faded, orange Denver Broncos cap - the one described by the parents. Fanning out downhill from that point, one of the searchers caught a glimpse of something blue. (Jimmy was wearing a bright blue jacket and dark jeans when last seen.) He was found huddled under a low-lying spruce. The child had not responded to the calls of the searchers. He was cold, hungry and frightened, but not too much the worse for his experience. Wrapped in an extra parka one of the searchers carried, Jimmy was returned to his parents shortly before midnight, just before the main body of the Gunnison volunteer team arrived.

Rescue operations have been with us since Og fell in the river and snagged his Mammoth skin loin cloth on a branch, but **Search and Rescue Teams** have only been around the United States for the past 35 years. Search became a necessary operation as people became more and more "civilized" and less and less educated about how to get along in the wilderness.

In the early days, searching was performed by unorganized, well-meaning, highly-unsuccessful volunteer groups of individuals who happened to be available. Today the SAR field is experiencing tremendous growth, and most areas have trained, semi-professional teams ready to respond at short notice. Manuals on SAR exist, national training courses are available, computers and even satellites are being utilized.

Persons interested in becoming involved in SAR should know from the start that payment for services is extremely rare. If you have an interest, start by collecting information on your local area. Talk to government and law enforcement agencies to find out if any local teams exist and how they function. (Expect large differences in the way different teams operate.) You may find an already-existing team. If not, you may wish to start one. For further guidance, contact the Mountain Rescue Association (MRA) or the National Association for Search and Rescue (NASAR).

Stan Bush, past president of the Colorado Search and Rescue Board, and a life member of NASAR, offers this final piece of advice: "The most important single consideration is to realize that deciding to go into search and rescue does not mean that the group will be active in this program overnight! It takes years of work and training before any group can be considered effective. This must be accepted."

For more information on getting involved in search and rescue, contact:

Mountain Rescue Association, 2144 S. 1100 E., Suite 150-375, Salt Lake City, Utah 84106.

National Association of Search and Rescue, P.O. Box 3709, Fairfax, Virginia 22038. **

Explore Ecuador!

December 29, 1991 to January 12, 1992

Enjoy high-altitude mountaineering in the unspoiled jewel of Andean countries. Two volcanic mountain ranges have sheltered Ecuador's culturally rich central valley from the pressures of the twentieth century. We'll begin our adventure in the capital city of Quito, where cobbled streets, city parks, mansions, museums, and restaurants keep our minds engaged while our bodies adjust to the altitude. Then it is off to the mountains where practice in basic snow and ice mountaineering techniques and instruction in high-altitude physiology will inform our ascents of Cayambe (5790m) and Cotopaxi (5897m). The trip will conclude with shopping for local goods in Ortavalo, a quaint market town. University credit an option. Land cost, $1450. For more information write or call: Ken Thompson, Student Services, Towson State University, Towson Maryland, 21204, (301) 830-3741.

Eldorado Rescue

A first-person account by Jono McKinney, NOLS Instructor

EMT and cliff rescue seminars, practice drills, first aid classes taught tens of times, images of rope litters seen in climbing books in years past, emergency procedures, radio briefings, and good old improvisation; all these came together on the afternoon and night of July 18 as Kevin Tally and I, and NCM 6/26b, came across an injured party near Eldorado Peak in the North Cascade Mountains.

Just as our group was preparing to rig up for a traverse of the sweeping Inspiration Glacier, two climbers approached us from the glacier. Thoughts of a straightforward walk across this glacier diminished as climber Dave's grisly face came into focus. A face, blood encrusted on the left side, an eye swollen shut, a smashed nose, a limp, and delicate use of his ice-axe, suggested a fanfare of injuries. Furthermore, he was in shock and showing early signs of hypothermia. Details of the accident soon revealed Dave had fallen 120 feet, pulling out all of his "pro." His 53-year-old partner, Joe, was ripped off the belay stance and yanked 70 feet down into a moat where he was buried under falling snow, ice blocks, and rocks. Neither climber was wearing a helmet. After an hour, digging with badly injured arms, Dave was able to uncover his immobilized partner. He left him there, propped against a rock, supposedly falling out of consciousness, and ran for help to his other friends who were climbing the standard snow route on the East ridge. After joining up with his friends, he and Jack started for camp to get gear and/or help. On their way, they found us. Without a moment's hesitation, Kevin, the course, and I dove into action and spent the next 15 hours caring for these ill-fated mountaineers.

A quick examination and interview of Dave left me reasonably assured that he had not sustained an internal head injury. Besides the gruesome gash over his left eyebrow, his other injuries included possible fractures of both wrists and an elbow, a broken nose, loose incisor teeth, and numerous bruises all over his body. We got him out of his wet clothes and put him in a sleeping bag with hot water bottles and drinks, elevated his feet, and, most importantly, reassured him that his nightmare was over. We briefed the students on further care for Dave. This included cleaning and closing his wounds, splinting his arms, monitoring his condition, completing another secondary survey, and providing Dave and his friend Jack a safe haven for the night. Then, Kevin and I outfitted ourselves for a rescue on Eldorado Peak, anticipating we would spend the night on the mountain caring for a hypothermic, head-injured patient and anticipating the need to lower the person down steep snow at the base of the South Face to a point where a helicopter could whisk him away to medical care. We brought two strong and fast students with us as back up, to help carry rescue gear, and act as messengers across the glacier, if necessary.

With Dave's situation under control, we raced off across the Inspiration Glacier and up 1000 feet to the targeted moat on Eldorado Peak. Enroute we picked up another member of the party running across the glacier alone. We had him tie in with our student rope team. When we reached the moat, I hollered to pinpoint Joe and his friend Bob (who had come up to help Joe after getting word from Dave). My pulse immediately dropped when our anticipated head injury patient answered me lucidly and with a strong voice. We jumped across shaky snow blocks wedged over a deep moat to reach Joe and Bob, who were situated on a rock ledge.

I introduced myself and started from the beginning of my EMT training for the second time that day. It was soon clear our immediate concern was not a head injury, but hypothermia. Dressed in soaked Levis, cotton socks in wet leather boots, and wet down clothing over a t-shirt, Joe was shivering uncontrollably and growing weaker. The report from Bob that Joe had regained color in his face and that he had remained fully lucid over the last several hours was encouraging.

"It was soon clear our immediate concern was not a head injury, but hypothermia."

Kevin already had hot drinks brewing and was preparing a proper platform for the tent in this jumbled moat. Within minutes of our arrival, Joe was out of his wet clothes, in a sleeping bag with a hot water bottle on his belly and warm fluids sliding down his thirsty throat. Joe's injuries included a forehead laceration, possible fractured rib, a broken patella, and numerous painful bruises almost everywhere on his body. Despite his condition, he never complained and assisted us with his stoicism and positive spirits.

Time to come up with a plan. The givens: 1) Joe was in a stable condition; 2) a helicopter evacuation would be necessary for Joe and Dave; 3) we would have to get Joe out of this moat and litter him down 1000 ft. of steep snow to an acceptable landing area, keeping him warm and comfortable throughout; 4) we needed to keep Bob safe during the progress of this evacuation. The solution

was simple in conception, but as many hours of work revealed, lengthy in execution.

Radio and maps in hand, I climbed out of the moat preparing to make radio contact with air traffic overhead. So as not to concern folks at the NOLS base in Sedro Woolley, I used none of the pre-arranged codes that might suggest we had a course emergency. Before I had the volume turned up, I had a contact. "Mayday! Mayday! Mayday! This is Jono McKinney on Eldorado Peak in North Cascades National Park requesting helicopter evacuation for two victims of a climbing accident." My heart beat faster when I heard back through the static: "Seattle, I'm picking up a mayday signal." I'd been heard. We switched to a clearer frequency and within minutes the plan was underway. The generous Cessna pilot who had picked up our signal flew 30 minutes out his way to locate us and allow Seattle air control to pinpoint our (his) position by radar. With communications clear, I turned off the radio to save battery power and began working on the evacuation plan.

Kevin carved a veritable stairway out of the moat while students John McDonald and Marshall Fordyce delivered gear and stomped out a wide pathway along the moat edge to a suitable point from which we could begin the lower. When finished, they returned to camp under the gibbous moon, where they found their comrades, who had been busy caring for Dave, and friends Jack and Eric. Student, Carter Lee, had fully cleaned Dave's wounds, closed the deep cut on his forehead with butterfly bandages, splinted his wrists, and kept him entertained with stories and small talk. While he was busy with Dave, the other four students cooked up a meal. They lent sleeping bags and a tent to the team while they squeezed seven into one tent for a sleepless, but giggly night. With limited experience, they did a first class job caring for Dave and Co.

Up on the mountain, Kevin and I continued our work by headlamp. Our rescue helicopter would be coming at first light. I dug for memories of a rope-litter built six years earlier as an exercise with my students while teaching at a school in Colorado. Step-by-step, I remembered the whole contraption. Lined with an ensolite and thermarest pads and a sleeping bag, the litter would be completely satisfactory. Kevin continued carving and providing Joe and Bob with a steady flow of hot drinks, while I rigged up the lowering systems. With injured knee, Joe was willing to try walking with assistance and a belay out of the moat to the litter. His courage was a tremendous help for us.

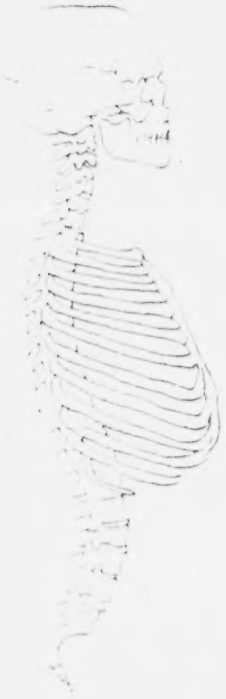
When all the components of the lowering system were ready, we prepared Joe for the move. With Bob's assistance, and Kevin and I belaying from front and rear, he walked up and out and across the moat on our highway and laid down on the litter. As soon as we had him laced in, cramps seized his thighs. I massaged these out and we were able to continue. I would belay and lower from the top while Kevin, tethered to the rope, dragged and directed the litter down the mountain. At first, we had two ropes tied together. Later, the second rope was needed to attach Bob to our system as we came closer to crevasse areas. The lowers worked well at first and we made good progress. But soon, crevasses hidden in the darkness made our retreat more difficult. A tension traverse was set up to move along a wide crack. And then, more lowers, each with slight problems requiring new solutions. The physical and mental concentration was draining. Finally, at 2:30 a.m., after eight lowers in 3.5 hours, we were approaching level ground. Kevin and I scouted for a tent platform. Minimal chopping and stomping rendered a fine spot. We dragged Joe the remaining distance, and by 3:30 a.m. he was comfortably ensconced in the tent with Bob. While I completed another assessment and filled out a medical report, Kevin stayed out in the brisk and blustery night fixing more hot drinks and food. Finally, at 4:30, we zipped shut the tent. With four people in the Stretch Dome, the tent was pleasantly cozy. Already, the eastern horizon was getting lighter.

An hour later we were up again, preparing a landing area. But barely started, we could hear the rotors of an approaching helicopter chopping at the calm, cool, morning air. The Seattle TV5 news chopper was in the area to offer back-up to a larger ship coming from Whidbey Naval Base and to take photos. After doing many checks and losing ballast by dumping fuel in the area, the Navy rescue chopper dropped down to pick up Dave first, and then swung over our way to pick up Joe. It was amazingly simple and exciting.

In a great blast of rotor power, they were gone. We were left in the silence of the glacier with the glow of a brilliant sunrise on our faces. I stood for a moment feeling tired and achy, and tremendously pleased and proud of the rescue Kevin and I, and our course, had just performed. We had saved at least one life last night. Relying on our training and improvisation, we had cared for two severely injured climbers and their three helpless comrades, and we had performed a technical evacuation from a remote mountain.

Back in camp and after some needed rest, we got together to debrief ourselves. For all of us on the course, it was a rich learning experience. The students were able to use all their first aid and emergency procedure skills in a real rescue with live, bleeding, and worried patients. Having to manage such an incident, sharing their camping supplies, and "sardining" into one tent, created a new and greater sense of togetherness and cooperation. Returning that morning I realized I was returning to a different group. For me, the rescue had tested all my resources and creativity. It gave me new confidence in my abilities to think productively while under stress and manage crisis situations. We all felt great satisfaction for having done this difficult job so well.

The next morning, proud but not arrogant, we at last moved to our intended camp of two days earlier. With time in the afternoon, we roped up and summitted on Eldorado Peak hours later. NCM 2/26b continued on its way. ••



The Headbone Is Connected To The...

by Bill Clem, M.D.

As the song goes, the head bone is connected to the neck bone, and it is the neck that is often a bone of contention in emergency medical care. Cervical spine injuries hold an honored place in EMS operations due to their often subtle presentations as well as the terrible consequences of missing one.

One of the basic tenets in medicine is "to do no harm," that is, do not make the patient's condition worse. To have a patient moving all fours and make him a quadriplegic because you let him sit up for a drink of water is a nightmare for us and a dream for lawyers. Our urban EMS counterparts have adopted a policy that the mechanism of injury determines whether or not a patient is immobilized.

Strapped to a backboard with rigid cervical collar in place, two-and-a-half rolls of tape later the patient finds himself in a modern-day version of the rack. But a short ride later the patient is examined, X-rayed, and is, mercifully, released. The bottom line is that most patients placed in cervical spine immobilization do not have unstable cervical spine injuries. But the system works because the extra work and inconvenience serves to protect the very few who do have serious injury.

But, as I have pointed out before, what works for our urban counterparts does not always work on the mountainside or in a cave. Imagine the poor bloke who finds himself strapped to a board in subfreezing temperatures, slowly becoming hypothermic over the 10-12 hour evacuation, only to have an emergency physician "clear his C-spine" within 10 minutes of his arrival in the emergency department. Or, how about the poor sods who carried him for 10-12 hours when he could have walked out on his own. So there is reason to examine the policy of "splint 'em where they lie," and so we shall.

But first, a disclaimer. There is always the chance of missing a cervical spine injury and causing harm to the patient. If you always want to be certain, immobilize every patient on a backboard, even those with sprained ankles. What I offer here is an approach that I have practiced for my own use; I can only say that it works for me, whether it suits your purposes and training is for you to decide.

A number of steps are involved in clinically (rather than with X-rays) clearing a patient's cervical spine of any serious injury. If at any point there is any question or ambiguity, he is immobilized. When I examine a patient I first simply ask what hurts. If the patient complains of any neck pain, numbness or weakness he goes in C-spine precautions. I consider complaints of shoulder pain equivalent to neck pain, as some neck injuries refer pain to one or both shoulders. So, to proceed, the patient must have no complaint of neck pain, numbness, or weakness.

Next, the patient must be awake, alert, oriented to person, place, and time; and have no drugs or alcohol on board. Patients under the influence of drugs or alcohol should be judged incapable of assessing their own injuries. Likewise, unless the patient is fully mentally alert with no evidence of brain injury, he must be treated as if he has a cervical injury.

The mechanism of injury must be considered. A fall from a picnic table is less likely to result in a neck injury than a 200 ft. leader fall. Despite the patient's protests, if I feel the mechanism of injury is obviously severe enough to cause head or neck injuries, the patient is immobilized. Keep in mind, also, that a certain portion of head injuries will result in accompanying cervical injuries. The best indicator of the severity of a head injury is the length of time the patient was unconscious. I let this be a guide: patients with significant head trauma always have a neck injury until proven otherwise.

Up until now, the patient has not even been touched. At this point I make certain the patient has no numbness or weakness. If in testing his motor or sensory function there is any deficit, the patient is immobilized. This sounds complicated, but sensation can be grossly assessed by asking the patient if he can feel my touch on his face, hands, arms, trunk, legs, and feet. Purists will say that other sensory functions should be tested, such as sharp pain (pinpricks close together) and hot/cold, but for my purposes soft touch seems adequate. As for motor function, a test of hand grip, finger movement, arm flexion/extension and full leg and ankle movement against resistance can be done without any neck movement if the patient is first cautioned against moving.

If the exam has been negative so far, I next gently feel the patient's neck, both on the sides and back. Unless there is no spasm, guarding, or tenderness, the patient has earned a ride on the plywood pony. The vast majority of patients who have cervical spine injuries

complain of pain; those who don't will usually have some tenderness or guarding.

At this point it is time to have the patient move a bit. While supporting the head, I have the patient gently flex the neck. Unless the patient is pain-free while moving the neck, he is immediately immobilized. If the flexion of the neck results in no pain, then the patient is asked to rotate the head gently. Again, pain and guarding are indicators of a possible injury and the proper precautions should be taken.

If, after all this, the patient still has no complaints, I let him move about a bit and begin to assess other injuries. If at any point the patient begins to complain of neck pain, stiffness, numbness, or weakness, then the backboard comes out.

This sums up what is to me a practical cervical spine injury exam. This has evolved over years of backcountry and helicopter operations. It is not perfect, but until the field portable X-ray machine is available, it is what I use. Mountain rescue operations are not played out in the best of circumstances. While we do our best to protect the interests of the patient, we must balance the difficulties and dangers of evacuating an immobilized litter patient against the possibility of an injury which may not exist. A difficult decision, but one we all face.

MRA Medical Committee Chairman Bill Clem is an emergency and hyperbaric physician in Denver, CO. Having been involved in mountain and cave rescue since 1974, Bill heads the Alpine Center for Rescue Studies, St. Mary's Glacier, CO.

Reprinted with permission of the Mountain Rescue Association Rescue Association Forum, (c) 1990 MRA. The Mountain Rescue Association is a non-profit volunteer organization dedicated to saving lives through rescue and mountain safety education.

**

First World Congress on Wilderness Medicine

Whistler, British Columbia, was an extravagant example of Canadian wilderness a few years ago. Cool, wet air off the nearby North Pacific still keeps the steep mountainsides buried in snow, but a substantial portion of the wildness has been replaced with one of the world's most popular and well-developed ski resorts. The towering Chateau Whistler is the center of the resort and, from July 14-19, housed the first official international gathering (and the seventh annual meeting) of members of the Wilderness Medical Society. More than 1000 people showed up, including guests, with 12 nations represented. In eight years the Society has grown from a small handful of outdoor-loving docs to a worldwide membership nearing 3000.

"Medicine and the Spirit of Adventure" was the subtitle of the Congress, and Dr. Barry Bishop set a tone of informality, but sincere concern with his introductory presentation. "Our adventures...," he said, "...demand attention (to the world's environments) if we are to maintain and improve our quality of life." This theme of working-for-a-better-world pervaded the week, highlighted by Dr. David Schlim's poignant question, "Why do helicopters evacuate rich trekkers while poor Nepalese children die from lack of care?", and Dr. Mark Plotkin's reminder, "The rapidly-vanishing rainforests cover 2 percent of the world's surface but contain more than half the world's species, including 119 known plants (with more to be discovered) whose pure extracts are used daily in life-saving medicines!" Perhaps the conference reached its peak when Dr. Philip Rasori quietly suggested we were too small a planet to survive expanding ill-health unless we become "citizens of our world and not just our nation."

Amid state-of-the-world's-health presentations were many lectures and workshops on old and new aspects of practical wilderness medicine: wound management in which we sutured pigs' legs, litter construction in which we did, water disinfection in which we filtered, iodized, chlorined, and drank water, helicopter evacuation in which helicopters came and evacuated, and Dr. Howard Donner's always-delightful and informative this-is-what-I-carry-in-MY-first-aid-kit talk. Current research has produced little over the past year in new field treatments, and controversy still rages over 1) whether or not to compress snake envenomations (at least it doesn't seem to make things worse if you do) and, 2) how much should non-physicians be "allowed" to do beyond the control of a physician (but doctors, in general, seem to be growing more supportive).

On Thursday evening, July 18, the presidency of the Wilderness Medical Society passed from Dr. Blair Erb to Dr. Howard Backer. We wish him and the Society their best year yet.

(The Society poses the greatest good for wilderness medicine today. We would like to see active, non-physician membership grow. For information contact: Dian Simpkins, Executive Secretary, WMS, P.O. Box 397, Point Reyes Station, CA 94956. Phone (415)663-9107.)

Patellofemoral Pain Syndrome (PPS)

[Editor's note: In WMN #23 (July 1990), we printed an article about this ailment. A reader who encountered the problem submitted this piece describing his experience with it and included some helpful additional information. We are pleased to pass it along.]

By Steven Fox

We have all heard stories of folks who injure themselves by training too hard for "the big expedition," wrecking their bodies trying to get them into shape. So when I was preparing to climb Denali last summer, I planned my exercise regimen around mostly low joint stress exercises: cycling and swimming, although once a week I did succumb to machismo and run a few dozen flights of stairs. Three months of this and I was feeling pretty fit, but then, 10 days before the climb, I ran stairs in my cheap sneakers instead of my running shoes, followed by too much breast stroke in the pool the next day. By five days before the climb my knees were very sore and aching; fearing that I might have to cancel the trip, in desperation I consulted a sports medicine specialist...

"Patellofemoral syndrome," she said, "Quite common, and, fortunately, not too serious, just painful."

The patella (kneecap) anchors the ligaments attached to both the quadriceps (upper leg) muscles, and the tibia (lower leg bone). As the knee joint flexes, the patella slides up and down in a shallow groove formed by the knobby end of the femur and its covering cartilage. Through various forms of overuse or abuse, the lining on the underside of the patella can become irritated and inflamed. The associated swelling causes increasing tension between the kneecap and joint: this is the source of the pain. In severe cases, the normally smooth patella underside can become roughened, this is a condition referred to as **chondromalacia**. The good news is that only in quite severe cases is the damage permanent; surgery is rarely indicated. As with most overuse injuries, a gram of prevention is worth kilos of cure. Prevention includes: strengthening with gentle exercise, limiting activities likely to induce irritation, and stretching properly before such activities.

There are two recommended strengthening exercises, leg lifts, and knee presses. For leg lifts, sit on the floor, with a two or three pound weight attached to each foot. One leg should be bent 90 deg. with your foot flat on the floor, the other should be fully extended, with your knee locked. Gradually raise, then lower, your fully extended leg about a foot off the floor, switching legs after each set of five lifts. Repeat two or three times. Over time you may increase the weight on each foot to a maximum of five pounds. (Crampons, plastic boots, and gaiters weighed just about right on Denali.) For knee presses, also sit on the floor, with a pillow or foam pad placed under your knees. Now, press down with one knee, or both knees together, attempting to straighten your leg(s) and flatten the pillow. Bend your toes towards your body as your heel rises. Hold for five seconds. Repeat about 20 times. Since putting stress on a half-bent knee (about 135 deg.) contributes most towards inducing PPS, lifting or pressing weights on a weight machine is not a suggested exercise.

The two recommended stretches, quadriceps and hamstring, should be familiar to any runner. The quadriceps stretch begins standing. Bend one leg until your foot touches the back of your thigh, then grasp your foot with one hand. Now push down and back with your leg muscles, holding for 15 to 30 seconds. Repeat for the other leg. Thigh stretches begin sitting, with one leg extended, and the other folded inward. Grasp your extended leg below the knee with both hands. Now, back straight, bend forward smoothly, attempting to touch your forehead to your knee cap. Hold at maximum flexion for at least 15 seconds. (Don't bounce!) Repeat for the other leg.

Activities that tend to induce PPS are those that involve either repeated shock loads to the knee, or continual stress on a partially bent knee. High risk activities include: downhill running, backpacking, and racquetball. Moderate risk activities include: cycling (especially uphill), downhill skiing, and tennis. Low risk activities include: swimming (flutter kick only), cross-country skiing, and slow jogging. In some cases, shock-absorbing insoles can also significantly decrease the irritation to your knees, besides making your footwear more comfortable.

Treatment consists of the usual measures: rest, ice, and ibuprofen. Do not continue an activity that causes distinct pain. Rest your leg in a straightened position, and avoid squatting or climbing. Frequently ice your knee for 30 minutes at a time, especially before and after exercise. (Snow works well in the field.) A doctor may often prescribe fairly large doses of an anti-inflammatory, such as aspirin or ibuprofen; these are usually quite effective in holding the condition at bay. (Six to eight hundred milligrams of ibuprofen, four times a day, chased by countless liters of water, made my climb more pleasant, if not pain free.)

I bought insoles, did my stretches and exercises, and took the medication. Carrying a 70 to 85 pound pack is never fun, but at the end of the trip, despite the stresses, my knees were in a bit better shape than when we began. If you take care of your knees, too, following the precautionary measures described above, yours just might last you a lifetime. **

Dispatches

OWMS Address

Several issues ago we included a brief article on the Osteopathic Wilderness Medicine Society, but we did not have an address. Their address is Osteopathic Wilderness Medical Society, 801 East 2nd, Suite 104, Benicia CA 94510.

Stingray Safety

According to a letter from Robert E. Falcone and Anne P. Miller ("Two Fathom Hickey," New England Journal of Medicine, Vol. 325, August 15, 1991, p.521), feeding stingrays by hand can result in a rather interesting complication. A 37-year-old woman was feeding fish to a stingray in 12 feet of water off the Cayman Islands when it missed the offering and sucked up her wrist instead. The stingray, which was somewhere between 3 to 5 feet in length produced a partial thickness contusion-avulsion approximately 2.5 by 1.5 centimeters. The wound healed without the use of topical or systemic antibiotics. These love-bite injuries are not uncommon in the Caymans, where stingray feeding has become a popular tourist attraction. The treatment of choice is to scrub carefully and withdraw more quickly the next time.

TRACE/SAR, Inc.

TRACE/SAR (Technical Resources and Command Equipment for Search and Rescue) is a small company in Morganton NC that is busy simplifying the world of SAR and backcountry travel in general. They "are dedicated to the principle that the practical use of map and compass should be simple to understand and simple to use."

They've produced a handy little template called the Grid Reader which, used in conjunction with a USGS 1:24000 scale map, allows backcountry users to define locations with a high degree of accuracy. NASAR thought enough of the device to include it in its Bookstore last summer. Other products are in the works. You can order a Grid Reader by sending $5 plus $1 postage to TRACE/SAR, Inc., 308 Forest Hill, Morganton NC 28655.

Wilderness Medicine Institute

P.O. Box 9, Pitkin, Colorado, 81241
Telephone: (303) 641-3572
Answering Service: (303) 641-4766

Wilderness Emergency Medical Technician Course
Pitkin, Colorado
January 6 - 31, 1991

This course is designed for outdoor leaders, backcountry rangers, rural ambulance attendants, and other individuals who provide emergency care in remote settings. While fulfilling the DOT minimum requirements for certification, this 160-hour program expands the topics to address the issues involved in extended care and introduces backcountry rescue techniques.

Certifications: SOLO's Wilderness EMT, National Registry EMT-B, and American Heart Association's CPR.

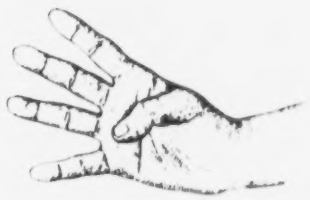
Instructors: Buck Tilton and Melissa Gray of the Wilderness Medicine Institute, Inc. and SOLO Wilderness Medicine.

Tuition: The cost of instruction, textbooks, handouts, and exam fees is $600. A discount will be given to WEA members.

Lodging and Meals: Write for information.

Registration: Enrollment is limited. To reserve a space send your name, address, and phone number, course name and dates, along with a non-refundable $300 deposit to **Wilderness Medicine Institute.**

Dr. Raynaud and His Cold-fingered Syndrome



By Buck Tilton

As the icy tendrils of winter swirled around his house in 1862, Maurice Raynaud took pen in frigid hand to first scratch out the description that would bear his name. The syndrome results from intermittent spasms in the peripheral vasculature accompanied by changes in color (pale white, cyanotic blue, or deep red) in the affected digits. These vasospastic attacks are precipitated by cold or emotional stress, and are usually bilateral in fingers or toes, and occasionally ears and nose.

Nobody knows what causes Raynaud's syndrome or disease. Perhaps it is a neurophysiological disturbance, increased blood viscosity, a metabolic imbalance, or a fault in the local arteries. The more popular neurophysiologic view holds that sufferers have been conditioned to vasoconstrict too early and persist too long when exposed to cold.

The effects are more common in women, but David knows the problem can strike men, too. He awakes most nights with the pain of de-circulation in his toes. Sleeping outdoors, even on relatively mild nights, requires him to keep a hot water bottle in the foot of his bag. He is not a happy camper, and he is not alone.

Many treatments have been tried, including use of tranquilizers, vasodilating drugs, hormones, avoidance of cold and emotional stress, and, in extreme cases, a sympathectomy (cutting the sympathetic nerves so the arteries cannot constrict).

For the past decade, researchers at the U.S. Army Research Institute of Environmental Medicine have been experimenting with techniques to counter-condition the nervous system of the neurophysiologically impaired. "Pavlovian conditioning," they write, "can significantly reduce the cold induced vasoconstrictive episodes associated with Raynaud's disease." Test subjects were required to keep their distressed hands in hot water while alternately moving their bodies back and forth between warm and cold ambient air. The process conditions the brain to keep the peripheral vasculature dilated despite the changing air temperature.

Researchers concluded "that classical conditioning therapy is a feasible alternative to more traditional drug or surgical management. This technique avoids the side effects of drugs and loss of nerve function following sympathectomy." They further concluded: "We have seen no evidence to support the conclusion that individuals with Raynaud's disease or phenomenon are emotionally unstable as a group."

Although the treatment is simple and easily carried out at home, Dr. Murray Hamlet, Director, Cold Research Division, USARIEM, adds these points: 1) Some people train quicker and better than others. 2) Some require training yearly, but most have relief of symptoms for a number of years. 3) The training may not be effective in autoimmune patients.

Instructions for Home Treatment of Raynaud's Disease

A decision to try this treatment should be based on discussion with a physician.

You will need:

- Two insulated containers (such as styrofoam or another type of cooler). One cooler will be placed in a heated indoor room and the other in a cold outdoor location such as a porch, balcony, or garage, where your torso can get quite chilled while your hands are immersed in hot water.
- Thermometer
- Hot tap water to fill your containers (104-108 deg.F or 41-43 deg.C). Be sure to keep the water at the correct temperature.

You should wear:

- Normal indoor clothing, such as a long-sleeved shirt and pants. Over-dressing will **defeat** the purpose of the treatments; however, **avoid prolonged exposure to severe cold!** The torso must get uncomfortably cold.
- Gloves **(be sure to protect your hands at all times!)**

Remember these important points:

- Do not perform the treatment every day, do the treatment cycles every other day.
- You will need to complete about 50 cycles total.
- You will need to complete three to six cycles per day, every other day. It is best to do the cycles sequentially, that is, after one cycle wait approximately 20 minutes and then begin another cycle.
- Some people train quicker and better than others.
- Some require training yearly, but most have relief of symptoms for a number of years.
- The training may not be effective in autoimmune patients.

Now you are ready to begin. This is one cycle:

- Begin at your warm indoor location. Pre-warm your hands in your container of hot water for two to five minutes. Dry your hands and put on gloves.
- Go to your cold outdoor location. Remove gloves and immerse both hands in hot water for ten minutes. Dry and cover your hands and return indoors.
- Place hands in hot water again until torso has warmed up (two to five minutes). **

AAOS Announces New Book

A new textbook for rescue training has been released by the American Academy of Orthopaedic Surgeons (AAOS). **Basic Rescue and Emergency Care** is designed to provide fire, ambulance, police, industrial, park service, and other rescuers with the fundamental skills necessary to be an effective part of the modern, high-tech rescue team.

This 333-page, soft cover text is the first to present not only state-of-the-art rescue techniques for urban and rural environments, but also essential medical care and personal safety measures to ensure the best possible outcome for the victim and for the rescuer.

Written with the assistance of the National Association for Search and Rescue (NASAR), **Basic Rescue and Emergency Care** is the cornerstone of the rescue training curriculum being developed by NASAR and AAOS. It is also the first in a series of rescue texts from AAOS. Two texts to be released later in 1991 will deal in-depth with vehicle rescue and with agricultural and rural rescue.

Basic Rescue and Emergency Care can be ordered by calling AAOS at 800-626-6726.

The Wilderness Medicine Newsletter, Inc.

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Managing Editor: Kenneth L. Thompson, M.S., WEMT

Contributing Editor: Buck Tilton, M.S., WEMT-I/C

Features Editor: Frank Hubbell, D.O.

Production Editor: Carolyn J.C. Thompson, M.Ed.

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The *Wilderness Medicine Newsletter* is intended as an informational resource only. Neither the WMN nor its staff can be held liable for the practical application of any of the ideas found herein. The staff encourages all readers to acquire as much certified training as possible and to consult their physicians for medical advice on personal health matters.

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SOLO Wilderness and Emergency Medicine Seminars 1991-1992

Course costs:

- Wilderness First Responder (10 days): $625
- Wilderness EMT (one month): $1125

Residential courses include lodging, meals, all instructional materials, textbooks, and examination and certification fees. Costs may vary for courses at sites other than SOLO.

Wilderness First Responder

- Oct 28 - Nov 6 (AMC, NH)
- Dec 2 - 11 (SOLO)
- Dec 12 - 21 (Hulbert OC, VT)
- Jan 2 - 11 (Unity College, ME)
- Mar 2 - 13 (Nantahala, NC)

Wilderness Emergency Medical Technician

- Oct 28 - Nov 22 (SOLO)
- Nov 25 - Dec 19 (Teton Science Center, WY)
- Jan 6 - 31 (SOLO)
- Jan 6 - 31 (Nantahala, NC)

WEMT Recertification $175

To ensure that "Wilderness" issues are sufficiently covered, an additional day is added to our traditional 3-day EMT Refresher. Completion of the 24-hour EMT refresher and the 8-hour WEMT segment plus exams will recert a SOLO WEMT and provide eight hours of continuing education credit.

- Nov 23 - 26 (SOLO)
- Dec 27 - 30 (SOLO)

Winter Medicine, Rescue, and Survival

Preparation, prevention, bivouac, and evacuation are key considerations. Plenty of hands on experience. Contact the AMC, (603) 466-2727 for registration information.

Other Course Offerings

SOLO offers a variety of courses in rescue, including High Angle, Advanced High Angle, and Water Rescue. **Backcountry Medicine**, a 2-day course at the basic level, has been a favorite of college outing clubs and other organizations since 1975.

For more information, write to:
SOLO, RFD 1, Box 163, Tasker Hill, Conway, New Hampshire, 03818
Or call: (603) 447-6711

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Wilderness Medicine Newsletter

FOR THE RECOGNITION, TREATMENT, AND PREVENTION OF WILDERNESS EMERGENCIES

November/December, 1991 Volume 2, Number 6

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Fun with the Mentals of Blood Pressure

By Buck Tilton

Blood pressure (BP), the pressure of pulsing blood against arterial walls, is one of the most important vital signs, and one often ignored in the wilderness because the rescuer thinks, "Isn't that just something you do if you're in an ambulance?" or, "Hey, man, I didn't have one of those cuffs!" We are going to take a look at 1) how to get a blood pressure, even without a cuff, and 2) what that number tells about the patient.

Taking a Blood Pressure

Cuff is an easy name to say instead of sphygmomanometer, a word for which there is really no excuse. Most commonly, the cuff is used in conjunction with a stethoscope. Many scopes have a two-sided patient end: a flat side called the diaphragm, and a rounded side called the bell. Use the diaphragm side when taking a blood pressure, and, if there are two diaphragms, use the larger one. The bell is usually used for listening to respiratory sounds. Attached to the cuff is an aneroid gauge or manometer. Inside the gauge is a metal bellows that expands or collapses with changes in pressure. Those changes are reflected on the dial of the gauge, calibrated into millimeters of mercury (mmHg) so everyone talks the same language. An advantage of

(Continued on page 2)

. . . Blood Pressure

(continued from page 1)

the aneroid gauge is its portability, a disadvantage is its susceptibility to inaccurate readings with major weather changes. Mercury-gravity gauges, seen in hospitals, are more precise but impractical in the field.

The cuff itself is a rubber bladder inside of a cover. The bladder has two tubes leaving its middle, one to the gauge, the other to the rubber bulb that inflates the bladder when squeezed. Bladder sizes vary and adults must have their pressure taken with an adult-sized cuff, children with children-sized cuffs, infants with baby cuffs, or else the readings will be inaccurate. The cuff is wrapped snugly around the patient's arm, about one inch above the elbow, with the two tubes placed over the brachial artery. Before taking the blood pressure, make sure the patient's arm is relaxed and the cuff is on the same level as the patient's heart.

With the gauge in view, the rescuer should palpate the radial artery, then, with a finger on the radial, squeeze the bulb with the other hand and inflate the cuff until the radial pulse disappears plus about 20 mmHg more. Now the rescuer is ready to take a BP by auscultation (by listening). Place the diaphragm of the stethoscope over the brachial artery. Begin deflating the cuff at a rate of 2 - 4 mmHg per heartbeat. (If the rescuer has taken a pulse first, it is easier to judge the rate of deflation.) The needle on the dial should drop slowly. Sounds heard through the scope, called Korotkoff sounds, relate the blood pressure. The needle will be pointing to the systolic pressure when the first sound is heard. Systolic pressure is the force exerted against the arterial walls by the blood when the heart's left ventricle contracts. A normal systolic is 100 plus the age of the patient up until 150 mmHg. Women's BP's are usually a little lower. Above 150 is usually considered high blood pressure. When the last sound is heard, the diastolic is read. Diastolic pressure is the blood's pressure against the artery when the heart is at rest. A normal diastolic range is 60 - 90 mmHg, with anything above 90 being hypertension. The difference between the systolic number and diastolic number is called the pulse pressure. Pulse pressures normally range between 35 and 50 mmHG, and are a measure of the pressure of the pulse wave.

Although a blood pressure often measures a couple of mm's higher on the left arm, the difference between left and right arm is insignificant. Take a BP on the arm that's most available. If a second reading is necessary, wait at least 15 seconds before reinflating the cuff. Some patients will be in pain, or nervous, and their apprehension will alter their pressure. The rescuer needs to be a calming influence.

Without a scope but with a sphyg...er, cuff, a systolic pressure can still be obtained. The process is this: palpate the radial pulse, inflate the cuff, maintain contact with the point of the radial pulse during deflation, note the position of the needle on the dial at the first palpable return of pulse, and that's the systolic. There is no point in trying to get a diastolic via palpation (by feeling).

Estimating a Blood Pressure

Without a scope or cuff, as often occurs in the wilderness, it is possible to guess blood pressures by palpating pulses. This may be called blood pressure by estimation. Here are the suggested estimations from *Wilderness and Rural Life Support* Guidelines, edited by Robert J. Koester:

- carotid pulse present: BP is greater than 50mmHg
- femoral pulse present: BP is greater than 60mmHg
- brachial pulse present: BP is greater than 70mmHg
- radial pulse present: BP is greater than 80mmHg
- pedal pulse present: BP is greater than 90mmHg

Another quick gauge that, in the past, had been widely used to determine if a patient had an adequate blood pressure was the capillary refill test. Press a thumb into the skin on someone's forehead and watch the white splotch turn pink again. The theory was that the pinkness in a healthy person should return in about 2 seconds and that longer times indicated low BP. A recent study done at UCLA indicates that the capillary refill test is not a usable indicator of blood pressure (Schriger D.L., Baraff L.J.: "Capillary refill--is it a useful predictor of hypovolemic states?" *Annals of Emergency Medicine*, 20: 601 - 605, 1991.).

Understanding a Blood Pressure

Normally, the left ventricle of the heart contracts with a force of 100-140 mmHg while the right ventricle pumps at 20-25 mmHg. When the brain senses some portion of the body needs more oxygen, a signal is sent to the heart to increase its effort. Stress and exercise are two primary stimulants working to increase blood pressure via effort. Some chemicals cause a rise in BP because they cause vasoconstriction. The constricted vessels resist blood flow and, thus, increase BP. Epinephrine (adrenalin) increases BP in this manner, as does nicotine and caffeine. In relation to injury, increasing intracranial pressure (ICP) will cause the pressure to rise, with the

systolic rising faster than the diastolic, so the pulse pressure increases.

Shock may cause cardiovascular collapse through heart failure or loss of resistance in the vessels, and so BP will drop. Fluid loss from the patient's circulatory system (blood loss, diarrhea, sweat, etc.) may have the same effect. Nitroglycerin is a chemical taken by some heart patients to increase the size of their coronary arteries, reducing the pressure around the heart and allowing it to receive more blood. Some patients with high blood pressure take medications to reduce their BP. These drugs are diuretics, causing the body to excrete excess fluid, thus lowering the pressure in the system. In relation to injury, cardiac tamponade causes the systolic to drop faster than the diastolic, so you get a decreasing pulse pressure.

Other indications of a dropping blood pressure include dizziness or lightheadedness if the patient sits up. And, although difficult to judge in the cold outdoors, the patient's skin will go pale, and eventually cyanotic, indicating that there is not enough pressure to keep the peripheral tissues supplied with oxygen.

Typically, it is the falling blood pressure that most concerns us in the wild outdoors. When the BP drops below 70 mmHg, the kidneys lose their ability to remove waste products from the blood. As these waste products accumulate, the blood becomes toxic. When the BP drops below 50 mmHg, the other internal organs start to fail. So, when your patient loses their brachial pulse, the BP is so low they're in trouble. When they lose their carotid, they are in serious trouble...or dead.

A record of your patient's blood pressure, or estimation of BP, may be of vital importance to the long-term care of your patient. A series of readings, recorded over time, will indicate whether your patient is getting better, or worse, or is stabilizing. This information will assist you in determining both the effectiveness of your treatment and the the urgency of an evacuation, and it will help ER docs in their ultimate diagnosis. The pressure is on, and that's great. **

Book Review

NOLS Wilderness First Aid

by Tod Schimelpfenig and Linda Lindsey
National Outdoor Leadership School
P.O. Box AA
Lander, WY 82520
$10.95, 337 pages

For 26 years the NOLS philosophy of outdoor education has stressed the need for placing, as Jim Ratz states in this book's preface, "good judgment before the rote learning of technical skills." The wilderness provides, the introduction continues, "no simple solutions for complex emergency situations." Despite the fact that Tod's last name is unpronounceable, the rest of this excellent resource does provide a sound basis for making those critical judgments about the care and rescue of the ill and injured in wilderness situations.

The book is intended to be a text for the first aid section of NOLS semester courses, but it is highly functional as a basic text for any wilderness first aid course, an information source for outdoor enthusiasts, and a resource (even though it is slightly bulky) tuckable into a pack or canoe bag. *NWFA* will help train the student to 1) prevent, recognize, and treat common wilderness medical problems, and 2) stabilize the severely injured or ill patient for evacuation.

Chapters One through Nine cover the fundamentals of patient assessment, shock, soft tissue injury, burns, fractures, dislocations, chest, head, and abdominal injury. Chapters Ten through Twelve address the problems associated with heat, cold, high altitude, poisons, bites, and stings. The final seven chapters discuss a variety of topics including athletic injuries, gender-specific problems, hygiene, seizures, diabetes, hydration, dental emergencies, and the effects of stress on the rescuers. Appendices include suggestions for first aid kits and emergency procedures for outdoor groups.

Tod, an EMT for 17 years, is safety and training director for NOLS. Linda, a RN and an EMT, is safety and training coordinator for NOLS. They have combined their many years of expertise in a very understandable, must-read book for anyone who wants to provide care in the wild places. Joan Safford has provided precise, profuse, and often humorous illustrations.

NWFA may be ordered from Chavawn Woodall, NOLS Publications, Box AA, Lander, WY 82520. Telephone: 307-332-6973.

Tod and Linda are often found teaching Wilderness EMT & First Responder courses at NOLS. Contact the NOLS office in Lander for more information on the Tod & Linda Show.

1992 NOLS Wilderness Medicine Seminars

February 10-21: First Responder
April 13-30: EMT
May 25-June 5: First Responder
September 7-18: First Responder

Current Research: Lessons Learned in the National Parks

"Wilderness Emergency Medical Services: The Experiences at Sequoia and Kings Canyon National Parks", by Jeffrey Johnson, MD, et al. in *American Journal of Emergency Medicine*. May 1991: Volume 9, Number 3, pages 211 - 216.

Reviewed by Ken Thompson

The jointly managed Sequoia and Kings Canyon National Parks (SEKI) lie in California's Sierra Nevada, about 2 hours from the nearest hospital. This report analyzes the EMS records of 434 patients who were assisted by employees of the system from August 1, 1986 through July 31, 1987. All SEKI employees are certified at one of seven levels of care: CPR, ARC multimedia 1st Aid, ARC 1st Aid and Personal Safety, DOT First Responder or ARC Advanced 1st Aid, EMT-Basic, Parkmedic, EMT-Paramedic. Of these seven categories one is unique to the National Park system, the Parkmedic. In order to become a Parkmedic, rangers must have served one year as an EMT-Basic and then have passed the NREMT-Intermediate curriculum, which includes MAST, EOA, IV-Therapy, and practical skills training and observation. Parkmedics have additional training in pathophysiology and patient assessment and are authorized to administer a range of medications including cardiac drugs.

Researchers compiled all 434 reports and categorized each by the nature and severity of illness or injury, the level of training of the care provider, whether the patient was transported to a medical facility or released at the scene, and a few other factors. This data was then fed to a computer for statistical analysis and further scrutiny by the doctors who did the study.

Statistical Data

Of the 434 patients, roughly 68% of the patients had suffered trauma and the remaining 32% were medical cases. Three fatalities (2 cardiac cases and a drowning) received timely but unsuccessful ACLS therapy, which was discontinued at the scene.

The mean age of the patients was 28 but the largest single group (21%) fell into the 10 - 20 year age bracket. Thirty-nine percent of the patients had suffered some form of extremity trauma, which was the most often recorded chief complaint. Forty-one percent of the trauma patients had fallen or tripped their way to injury, making it the most common mechanism of injury. (Editor's note: This supports Alan Hale's National Safety Network data, which indicates that merely walking down the trail ranks high in its potential for accidents.) The next most often reported complaint was head trauma, which was suffered by 16% of the total. Overall, 77% of the trauma cases and 81% of the medical cases were released at the scene. The average estimated time of arrival at a hospital (made for most patients even though no transport was made) was two hours. Of those who were transported, helicopter evacuation took an average of 90 minutes and ground evacuation took and average 125 minutes.

Discussion

The authors observe four major differences between the SEKI and urban EMS models. Their observations provide some useful advice pertaining to the appropriate training for backcountry care providers.

First, "most illnesses and injuries at SEKI are minor and occur in young previously healthy patients. Thus rangers are reluctant to transport them." SEKI's non-transport rate was 77%, compared to 38% for urban systems. It is worth noting here that providers having more training were more likely to seek additional advice through base station contact before making final judgments about patients. This suggests that more highly trained providers either recognize the potential for complications of seemingly innocent problems or that they are more concerned with liability, or both. As a result of this finding, the park system has begun to focus more energy on training for the BLS providers.

Second, response and transport times are dramatically different between the urban and wilderness environment. A 1988 study done at Yosemite, "reported a median time of arrival of medics of 1.5 hours after injury and a median transport time of 1.6 hour, comparable to the mean ETA of 2 hours at SEKI." Urban and suburban companies routinely reach their patients in six to ten

minutes. The authors suggest a tiered response, bringing the closest responder, regardless of level of training, to the scene first and then calling in more sophisticated providers as the situation requires or as they are able to get to the scene. One caveat is that the early providers may be in a position of making decisions about severity that they do not have the background to make. Once again the need for training is emphasized.

Third, "the small number of seriously ill or injured patients at SEKI makes it difficult for rangers to maintain their medical skills or to justify the cost of sophisticated training and equipment." Several Parkmedics saw fewer than five patients, one started no IV's in the park and some EMT-Basic's saw no patients at all. A related dilemma is determining in what advanced skills Parkmedics should hold certifications. The example given is that the Parkmedic's scope of practice does not include the needle cricothyroidotomy. Yet, the outlook for a patient who needs one and doesn't get it is "grim."

Fourth, the long transport times inherent to the backcountry have encouraged flexibility in allowing care providers to release patients after treatment for minor problems. In addition, the SEKI folks have educated physicians who are responsible for medical control about the problems of backcountry evacuation and have reached a point where cooperative efforts between the field and hospital providers allows them to make individual decisions about patients, rather than having to rely on written protocols that were developed in and for an urban environment.

The authors tentatively support the concept of the EMT-Wilderness, who may need such skills as wound cleansing and management, reduction of dislocations and fractures, etc. But they do point out that "Although tailoring scope of practice to the problems commonly seen in the wilderness setting is appealing, the impact of such a pre-hospital system remains untested, and these skills would probably suffer even more erosion without frequent use."

This article is worth a thorough reading by those interested in the certification topic, and it contains an excellent bibliography. **

Wilderness Medicine Institute

P.O. Box 9, Pitkin, Colorado, 81241
Telephone: (303) 641-3572
Answering Service: (303) 641-4766

Wilderness Emergency Medical Technician Course
Pitkin, Colorado
January 6 - 31, 1991

This course is designed for outdoor leaders, backcountry rangers, rural ambulance attendants, and other individuals who provide emergency care in remote settings. While fulfilling the DOT minimum requirements for certification, this 160-hour program expands the topics to address the issues involved in extended care and introduces backcountry rescue techniques.

Certifications: SOLO's Wilderness EMT, National Registry EMT-B, and American Heart Association's CPR.

Instructors: Buck Tilton and Melissa Gray of the Wilderness Medicine Institute, Inc. and SOLO Wilderness Medicine.

Tuition: The cost of instruction, textbooks, handouts, and exam fees is $600. A discount will be given to WEA members.

Lodging and Meals: Write for information.

Registration: Enrollment is limited. To reserve a space send your name, address, and phone number, course name and dates, along with a non-refundable $300 deposit to **Wilderness Medicine Institute.**

Additional Offerings in 1992

- Feb 10 -21 WFR at NOLS, Lander, WY
- Mar 21 -29 WFR at Pitkin, CO
- Apr 13 - May 1 = WEMT at NOLS, Lander, WY
- May 18 - Jun 12 WEMT in Pitkin, CO
- May 25 - Jun 5 WFR at NOLS, Lander, WY
- Jun 13 - 21 WFR at Pelican School, Santa Cruz, CA
- Jul 27 - Aug 21 WEMT in Pitkin, CO

Hand Injuries in Rock Climbers

by Ken Thompson

Extreme rock climbers, by definition, stretch the bounds of endurance, strength, and psychological toughness. They also stretch other things to the limit, most notably the flexor tendons and ligaments that make their fingers work. S.R. Bollen, Medical Adviser to the British Mountaineering Council, reported on some of these injuries in a recent article, "Hand injuries in competition climbers" (*British Journal of Sports Medicine*, Vol. 24, No. 1). Less than fifteen years ago, notes Dr. Bollen, when protection was not as advanced as it is today and when most climbers actually climbed mountains rather than walls, a high proportion of rockclimbing injuries were the broken bones sustained in falls. Now, as a result of the popularity of sport and competition climbing, and the finger-intensive training it requires, pinky problems top the list of climbing injuries.

To learn more about the damage climbers do to their hands, wrists, and fingers, Dr. Bollen studied the entrants in the 1989 UIAA Grand Prix competition held in Leeds, UK. A pre-competition survey indicated that a large number of the 67 participants had previous, and quite similar, injuries. Twenty-six percent had injured the proximal phalanx (that piece of the finger that connects the knuckle and the proximal interphalangeal joint, or PIP) of their ring fingers. The injuries occurred when the climbers were either slipping off of or pulling up on small holds using one or two fingers. The injuries produced bruising, swelling, and pain, which, in some cases, lasted for months.

Many climbers wrap tape around the proximal phalanx to provide some protection. No one has yet determined if this actually helps to prevent injury, but experiments are under way to figure out, theoretically, what protection taping might provide.

Another recurring problem was that of "fixed flexion deformity" of the PIP joints. Unable to completely straighten the affected fingers, these climbers have joints that lock at between ten and fifteen degrees. Climbers having this particular problem tend to have it on both hands.

This affliction probably occurs because of untreated joint inflammation that occurs after difficult training sessions on finger boards and on the artificial holds of climbing walls. When the inflamed joints are left to rest in a neutral position, joints will eventually stiffen and, over time, constrict to a somewhat limited range of motion. Dr. Bollen recommends stretching. Common sense would suggest, in addition, the application of RICE: Rest, Ice, Compression, and Elevation.

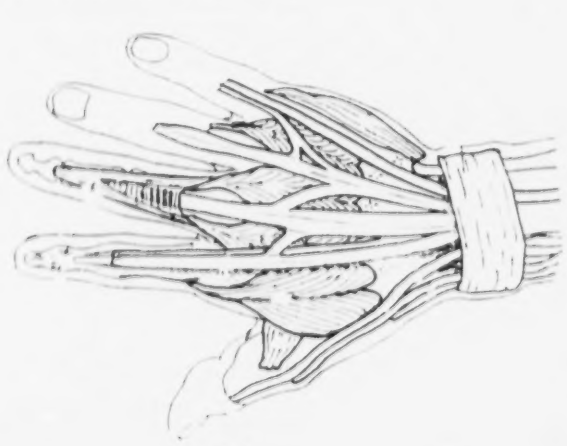
Researchers blame the high incidence of injury (about half the climbers had experienced previous injury) on both the continual increase in difficulty sought by climbers and the hard training in which competition climbers engage. He also thinks the "rather anarchic nature of the sport" keeps young climbers from getting enough guidance on appropriate training and safety techniques.

In the same issue of the *British Journal of Sports Medicine*, Andrew T. Cole links another injury to extreme climbing ("Fingertip injuries in rock climbers"). Climbers who have been doing sustained, difficult climbs for a week or more often damage the skin at the ends of their fingers. It becomes red and pussy, then white and macerated. Continued use may cause skin over the fingertips to split. While the damage done by sharp flakes and crystalline granite is obvious, Dr. Cole, however, attributes this particular problem to ischemia, or lack of circulation, in the fingertips. The enormous pressures generated by climbers hanging from their fingertips literally squeezes the blood out of the area. Dr. Cole recommends regular rest periods and several days off within a week of hard climbing. This common sense approach may prevent the lay-off of one to two weeks that will be required for healing once the damage is done.

Both of these gentlemen can reached for more information:

Mr. S.R. Bollen, MB FRCS, University Department of Orthopaedics, Clinical Sciences Building, St. James University Hospital, Leeds, UK.

Dr. Andrew T. Cole, 82 Main St. Woodhouse Eaves, Leicestershire, LE12 8RZ.



SOLO Wilderness and Emergency Medicine Seminars

1992 Schedule

Wilderness First Responder, $675* (10 days)

- Jan 2 - 11 (Unity College, ME)
- Mar 2 - 13 (Nantahala, NC)
- Mar 10 - 21 (NCOBS, NC)
- Mar 19 - 28 (Passages to Adv, WV)
- Mar 21 - 29 (SOLO)
- Apr 6 - 16 (AMC, NH)
- May 11 - 20 (Wolfcreek, GA)
- May 26 - Jun 6 (Hulbert, VT)

Wilderness Emergency Medical Technician, $1225* (one month)

- Jan 6 - 31 (SOLO)
- Feb 25 - Mar 5 (SOLO)
- April 6 - May 1 (AMC, NH)
- May 18 - June 12 (SOLO)
- June 29 - July 24 (SOLO)

*Residential courses include lodging, meals, all instructional materials, textbooks, and examination and certification fees. Costs may vary for courses at sites other than SOLO.

Wilderness/Rural EMT Module , $365

Designed specifically for EMT's and Paramedics, this module combines wilderness and rural techniques with the practical issues of extending care beyond the "Golden Hour." Those successfully completing the course will receive SOLO WEMT certification. The curriculum is based on the NAEMSP-approved protocols and has been reviewed and approved by the State of NH and the NREMT for CEU's.

Course cost includes lodging, meals, materials, and certification fees.

- Feb 3 - 7 (SOLO)
- Jun 18 - 22 (SOLO)

Backcountry Medicine, $75

Approved by the American Camping Association, this 16-hour course covers the basics of backcountry first aid with lots of hands-on practice. Recognized by many organizations as the minimum level of training for trip leaders and club members, those who successfully complete the course are certified by SOLO in Wilderness First Aid. The cost includes morning java, a copy of the book *Backcountry Medicine*, and certification fee. Call (410) 830-3741 for details.

- Feb 29 - Mar 1 (Towson State University, MD)

Other Course Offerings

SOLO offers a full range of emergency medicine courses including NREMT EMT-I and Paramedic modules. SOLO also offers a variety of other courses, including High Angle Rescue, Advanced High Angle Rescue, and Water Rescue.

For more information, write to:

SOLO, RFD 1, Box 163, Tasker Hill, Conway, New Hampshire, 03818

Or call: (603) 447-6711

WMN Dispatches

Medical Screening of Clients

Here at the WMN we are collecting data on how various organizations pre-screen clients. Since we know many of you are interested in the topic, we will compile what information we can, consult with some experts, and present, in a series of articles next year, the various opinions and techniques we gather in our research. Any information you can provide (e.g. forms or documents you use, good sources, or burning questions you may have) will be deeply appreciated. Naturally, we will give ample credit to anyone who pitches in. Thanks.

New Avalanche Safety Device

The Soviet Science Academy and a company in Leningrad have recently joined forces in an attempt to perfect an electronic subsurface sounding device. Once buried in an avalanche, victims are often lost forever unless they are wearing radio signal senders allowing their searchers, carrying receivers, to locate them. The new device will enable rescuers to find victims buried in snow and ice who are not wearing signal senders. More info on the device is available from Oleg Kluinin, Poisk, P. Lavrova Street 31, SU-191123 Leningrad, USSR.

Whisper at Your Own Risk

Whispering is the normal mode of speaking for someone suffering laryngitis (an inflammation of the larynx, or voice box). Sometimes laryngitis is associated with a loss of the ability to speak. But whispering is not easier on the vocal cords than speaking. In fact, it's about as abusive as yelling. A whisper forces your vocal cords almost together without letting them meet, which actually aggravates some forms of laryngitis.

The Shocking Truth

Once again, snakebite and electrical shock combine to 1) make the news, and 2) make me think that folk medicine, even "modern" folk medicine, is more difficult to change people's views on, when it's just plain faulty, than religion. But here's a guy in Arizona, bitten by his pet rattlesnake (a pet?) near his upper lip (a well-loved pet?), and what does he do? Hooks himself up to a sparkplug wire in his car while someone guns the motor! The patient immediately passes out...and he's still unconscious, and near death, when the ambulance pulls up at the hospital more than 90 minutes later. With IV fluids, hydrocortisone, and diphenhydramine (the victim had a history of anaphylaxis from the antivenin, having been bitten 14 times before), the doctors were able to start antivenin therapy and save his life. A piece of his face, however, did fall off. There is no evidence that electrical shock treats envenomations (Dart & Gustafson: "Failure of electric shock treatment for rattlesnake envenomation." *Annals of Emergency Medicine*, 20:659-661, 1991.) There is evidence that it makes things worse. The Food and Drug Administration has banned the import and sale of modified shocking devices marketed as snakebite treatment. As Bruce Goldfarb succinctly writes in the September 1991 issues of JEMS: "...electrical shocks really don't work, folks."

Gesundheit

Something stimulates the nerve endings that line your nose. Dust, pollen, hair, or such. An impulse travels deep into your brain, and the membrane lining your nose begins to secrete mucus. Another nerve message goes to your lungs telling them to explosively expel air. Structures in the back of your throat direct the explosion out your nose. The result: a sneeze. Nobody knows why some people will sneeze once and some sneeze repeatedly. (I'm a double-sneezer, my body never satisfied with just one.)

When you feel the need, let it rip. Trying to hold back a sneeze is not healthy. Beware especially of pinching your nose shut to suppress a sneeze. Air may be forced into your ears, spreading infection or popping an eardrum!

The Fungus Among Us

Clotrimazole has long been the most prescribed treatment for common fungal infections. We're talking about athlete's foot (tinea pedis), jock itch (tinea cruris), and ringworm (tinea corporis). The drug reportedly relieves itching, scaling, burning, and the other uncomfortable things associated with a fungus living on your body.

Now clotrimazole is available over-the-counter as Lotrimin AF (the AF standing for antifungal). It can be purchased as a solution in a small squeezable bottle or as a cream in a small tube. Lotrimin will probably run you somewhere between $5 and $7.

The infected area needs to be kept as clean and dry as possible. Body fungi doesn't like sunlight and fresh air, preferring to grow in dark, damp, enclosed spaces (between your toes, in your groin). Lotrimin is usually applied and massaged in gently, twice a day, morning and night. Being hearty, the fungus will probably live on about four weeks, in the case of athlete's foot and ringworm; with jock itch normally clearing up a week or two sooner.

Cardiac Arrest Update

Myron Weisfeldt, MD, immediate past president of the American Heart Association and keynote speaker at the recent Chicago Symposium on Methodology in Cardiac Arrest Research, set the stage in the "Windy City" for an increasingly fresh breeze of down-to-earth-ness in CPR.

"The scientific basis of much of accepted CPR standards," Dr. Weisfeldt said, "is extremely weak! We need to put in place a process for change in CPR by assessment through appropriate human investigation and impartial judgment."

Symposium Director, Lance Becker, MD noted that the first guidelines for CPR were based on very little research. "But the guidelines," he said, "became the Bible and people began to pray to it. We can no longer hold these things up as gospel. Nothing that we do is above intense scrutiny!"

Truth is, as the Fall 1991 issue of *Currents in Emergency Cardiac Care* reports: "Patients who cannot be resuscitated in the field are rarely resuscitated after transport to the hospital."

The symposium stated that the future of CPR lies in "the de-emphasis on precise CPR technique, the focus on early defibrillation, the renewed emphasis on adequate ventilation, various changes in drug therapy, and the adoption of the concensus process of evaluation of the science of resuscitation."

Tourniquet Update

From a recent issue of the New Hampshire EMS newsletter we quote: "Dr. Doug McVicar said that a tourniquet should be used only as a last resort in potentially life-threatening hemorrhage. It should be placed above the elbow or knee. A properly applied BP cuff can be an effective tourniquet. A tourniquet placed below the elbow or knee will not stop certain types of bleeding, and is potentially dangerous."

Ipecac?

Gack!

Poisoning ranks Number Five, overall, as a cause of accidental death in the United States, and Number One among accidental deaths in the pediatric population. (Hafen & Karren, *Prehospital Emergency Care & Crisis Intervention*, 1989.) Approximately 3 percent of all children in this country will be treated for an accidental poisoning.

Although these poisonings are rarely wilderness related, about 10 percent of all poisonings are ingestions of plant materials, and the possibility of a backcountry poisoning does exist.

Long has the debate raged over the efficacy of ipecac plus activated charcoal versus charcoal alone. Recent research lends evidence, at least in children. The new study indicates that ipecac 1) delays the administration of activated charcoal since the charcoal can't be given until after the patient vomits, and 2) delays release from the hospital.

In the study, which lasted two years, 70 children were tested. After ipecac, the children waited an average of 2.9 hours before charcoal could be given. Without ipecac, an average of 0.9 hours passed from poisoning to charcoal administration.

This study led Dr. Allan Kornberg, Children's Hospital of Buffalo, NY, to write that "...activated charcoal alone should be the gastrointestinal-decontamination method of choice for the mild-to-moderate pediatric ingestion patient..." (Kornberg & Dolgin, *Annals of Emergency Medicine*, 20:648-651, 1991.)

Arthritis: Camp Cramps Not Just For Gramps

By Buck Tilton

One out of seven Americans, say the stats, is affected by some form of arthritis. It is painful and inconvenient, often crippling, and almost always lasts forever. Hiking, biking, simple campsite chores, and even opening the envelope this newsletter came in can be miserable efforts. There are no happy thoughts here!

Arthritis is a disease of the joints, and over 100 types have been labeled by the experts, including spinal arthritis (ankylosing spondylitis), bacterial arthritis, and traumatic arthritis. Most people will, however, suffer either osteoarthritis or rheumatoid arthritis. With proper medications, exercise, and, sometimes, surgery and weight maintenance, sufferers can often stay active in the outdoors for a long time.

Osteoarthritis

Osteoarthritis involves cracking and flaking (the wearing out) of joint tissue, especially cartilage. By age 60 almost everybody is experiencing some osteoarthritis. Some of us inherit the tendency to "wear out" early. There is high level of suspicion that these patients have an enzymatic imbalance that causes the breakdown of their cartilage. Fingers, hips, knees, and spines are most susceptible. The symptoms of pain, stiffness, and swelling range from mild to severe.

Care and treatment involves taking it easy on the bad joints, which includes maintaining ideal body weight. Hot soaks and gentle stretching exercises will often reduce the stiffness. Pain and swelling are treated with over-the-counter non-steroidal anti-inflammatory drugs (aspirin usually being suggested first, or acetaminophen, or ibuprofen). Stronger NSAIDs are available by prescription. NSAIDs sometimes cause gastrointestinal ulcers and bleeding. A couple of years ago a new drug called misoprostol (sold as Cytotec[R]) became available to counteract the digestive tract irritation of NSAIDs. Exercise is critical in care and treatment, but not to the point where it further damages a damaged joint. Swimming and walking are often recommended. Prevention includes being careful and staying young.

Rheumatoid Arthritis

Exact cause unknown, but there seems to be an imbalance in the immune system of sufferers of rheumatoid arthritis. Instead of attacking attackers of the body, these people's immune systems attack their own joints, especially the thin membrane surrounding the joint. Symptoms include joint swelling, pain, tenderness, and, especially in the morning, stiffness, accompanied by unusual fatigue and general malaise. Joint deformities are common.

Care and treatment, once again, usually starts with high doses of aspirin. Some doctors will cautiously administer corticosteroids (prednisone, probably) for severe cases. Beware the long-term side effects. Drugs that sometimes modify the disease by inducing remissions might work. The same types of exercise are usually recommended. Hot soaks, hot pads, hot water bottles, and heat lamps may alleviate some of the stiffness. Cold packs may reduce the pain. The most dramatic recent advance in treatment is replacement arthroplasty (joint replacement surgery). The doctor puts in a metal or plastic joint. These have a high success rate in the knee, the hip, and the small joints of the hand. Prevention? Nope.

For more info on all types of arthritis, support groups, exercise classes and more, contact: The Arthritis Foundation, 1314 Spring Street NW, Atlanta, GA 30309. Telephone (404) 872-7100. **

Wilderness Medicine Conferences and Meetings

Second Annual Winter Wilderness Medicine

March 3 - 7, 1992 Big Sky, Montana

The Wilderness Medicine Society invites you to attend this conference whether you are an accomplished wilderness traveler, an expert in wilderness medicine, or are just beginning to cultivate an interest in the field. Fourteen hands-on workshops are scheduled in addition to many lectures by leaders in the field of outdoor medicine. Medical and allied health professionals from the EMT level on up will find that up to 28 hours of continuing education are available. Registration fees span $330 to $555 depending upon your level of training. Housing will be somewhat limited and a bit expensive. For more information contact: Janice A. Parr, Conference Coordinator, P.O. Box 460635, Aurora, Colorado, 80046. Phone and fax, (303) 699-2275.

Pre-Hospital Wilderness Medicine Conference

April 9 - 11, 1992, Park City, Utah

This conference which will be held at the Olympia Hotel in Park City is sponsored by the University of Utah, Health Education department and co-sponsored by Life Flight, the helicopter rescue folks. Now in its fourth year, this conference delivers substantial hands-on experience in the techniques responsible for reducing pain and saving lives. The tentative agenda includes practical sessions on poisonous plants, biking and diving emergencies, helicopter rescue, cave and water rescue and much more. CME's have been applied for; 2 hours of University credit are available. For content information contact Dawn Black (801) 581-8486, or Les Chatelain (801) 581-4512. For registration information contact: Conferences and Institutes, University of Utah, 2174 Annex, Salt Lake City, Utah 84112, (801) 581-5809.

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Managing Editor: Kenneth L. Thompson, M.S., WEMT
Contributing Editor: Buck Tilton, M.S., WEMT-I/C
Features Editor: Frank Hubbell, D.O.
Production Editor: Carolyn J.C. Thompson, M.Ed.

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Correspondence should be sent to: *Wilderness Medicine Newsletter*, 1208 St. Francis Road, Bel Air, Maryland, 21014. Questions and comments are welcomed.

The *Wilderness Medicine Newsletter* is intended as an informational resource only. Neither the *WMN* nor its staff can be held liable for the practical application of any of the ideas found herein. The staff encourages all readers to acquire as much certified training as possible and to consult their physicians for medical advice on personal health matters.

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Training Opportunities on the Water

Wilderness First Aid on Utah's San Juan River

April 3 - 10, 1992. Cost - $575.

Witness the desert bloom on this float trip from Bluff to Clay Hills, the entire 80-mile length of the canyon of the spectacular San Juan, before it flows into Lake Powell. You'll spend the evenings immersed in SOLO's time honored Backcountry Medicine/Wilderness First Aid curriculum, taught by Buck Tilton and Melissa Gray of the Wilderness Medicine Institute.

This entry-level course includes but is not limited to: patient assessment, shock, wilderness wound management, fractures and dislocations, cold and heat stress, altitude illness, and bites and stings. Send for more information or send a $100 deposit to the trip's co-sponsor: Four Corners School, East Route, Monticello, Utah 84535, or call 1-800-525-4456.

Offshore Medical Seminars in Benicia, California

In 1992, January 24 - 26, March 21 - 23, April 11 - 13, May 11 - 13. Cost - $400 individual, $600 couple.

This 3-day Offshore Medical Seminar is composed of lectures and labs, actual patient contact, and a syllabus of comprehensive notes that will serve as future reference. This course has been taught for 7 years, and has been well received by both the commercial maritime industry and ocean sailing enthusiasts alike. It meets or exceeds all USCG recommendations, and is approved by the USCG as a maritime medical education company.

The course setting is a specially designed medical complex that combines exam rooms with a conference hall. This allows students to participate in actual medical problems that present themselves to the medical clinic during class hours. Classes are kept small for a personalized experience. Dickie Hill, ex-Navy doc, avid sailor, and member of the Osteopathic Wilderness Medicine Society, is the course coordinator. A refundable deposit of $100/individual or $150/couple is required to reserve seating. For more information, write or call: 801 East 2nd Street, Suite 104, Benicia, California, 94510, (800) 728-2813, fax (707) 745-9352.

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